VOL. 23 No. 12

A UNITED STATES DEPARTMENT OF COMMERCE PUBLICATION

COMMERCIAL FISHERIES ABSTRACTS

FISH & WILDLIFE SERVICE
JAN 6 1971
LIBRARY

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE

UNITED STATES DEPARTMENT OF COMMERCE

Maurice H. Stans, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Philip M. Roedel, *Director*

FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.31 (0.7)(0.4) SYNTHESIS AND METABOLISM OF GLYCEROL-^{3}H TRIETHER, A NONABSORBABLE OIL-PHASE MARKER FOR LIPID ABSORPTION STUDIES

Morgan, Reginald G. H., and Alan F. Hofmann (The Gastroentherology Unit, Mayo Clinic and Mayo Foundation, Rochester, Minnesota 55901)
Journal of Lipid Research 11, No. 3, 223-230 (May 1970)

In the intestinal tract, lipid is partitioned between an oil phase and an aqueous micellar phase of bile and lipolytic products. Researchers have used nonabsorbable water-soluble markers to estimate absorption from or secretion into the aqueous phase. However, because the oil phase and aqueous phase may move through the gastrointestinal tract at different rates, such markers cannot be used with certainty for substances present in the oil phase. Therefore, an oil-phase marker would be useful for studies of lipid movement, absorption, and metabolism. The authors postulated that a glycerol triether might serve as an ideal lipid marker because it has the required properties of nonabsorbability, nontoxicity, and resistance to bacterial and digestive enzymes. The present study reports on the synthesis of a labeled glycerol triether and shows that such a compound appears to have the properties of a useful oil-phase marker for lipid absorption research studies.

The authors synthesized a saturated mixed-chain glycerol triether (1-hexadecyl-2,3-didodecyl glycerol (1-hexadecoxy-2,3-didodecoxypropane) with ^{3}H at positions 9 and 10 or ^{14}C at position 1 of the hexadecyl moiety. On the basis of various laboratory and animal feeding experiments, the triether appears to be an ideal nonabsorbable oil-phase marker for use in lipid absorption studies.
[4 figures, 6 tables, 25 references]

0.321 (3.239)(3.6) INTERNATIONAL SYMPOSIUM: "CHANGES IN PROTEIN IN FROZEN AND DRIED FOODS"

Van de Berg, C., and W. Klop (Lab. voor Levensmiddelentechnologie Landbouwhogeschool, Wageningen, The Netherlands)
Voedingsmiddelentechnologie 1, No. 8, 249-250 (1970)
Food Science and Technology Abstracts 2, No. 6, 781, 6G242-3 (June 1970)

The following papers were among those read at the subject symposium, held in Aberdeen [Scotland] in September 1969.

"Ice Formation in Foods" (R. M. Love)
"Mechanisms of Water Transfer During Drying of Foods" (A. C. Jason)
"The Condition and Properties of the Residual Water in Dried and Frozen Foods" (R. B. Duckworth)
"Changes in the Ionic Environment of Proteins in Frozen and Dried Foods" (L. van den Berg)
"Effects of Freezing on the Ultrastructure of Proteinaceous Foods" (A. Liljemark)
"Protein Aggregation and Dissociation in Frozen Fish" (F. J. King)
"Factors Influencing Protein Reactions in Frozen Fish" (W. J. Dyer)
"Chemical Reactions of Protein During Freeze-Drying of Foods and Model Systems" (M. Karel)

The authors of the article briefly summarize all the papers presented at the symposium.

0.33 ISOLATION AND CHARACTERIZATION OF PIGMENTS FROM PROTEIN-CARBONYL BROWNING SYSTEMS. ISOLATION, PURIFICATION, AND PROPERTIES

Clark, Allen V., and Steven R. Tannenbaum (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139)
Journal of Agricultural and Food Chemistry 18, No. 5, 891-894 (September-October 1970)

The colors and flavors that arise from nonenzymatic browning reactions contribute both to the destruction and to the improvement of foods. Previous workers have found that the Maillard reactions (browning reaction of carbonyl compounds such as sugars with proteins) reduce the nutritive value of foods; however, the pigments do not appear to be associated with any toxicological response. The early steps of the Maillard reaction involve the formation of increasingly unsaturated multicarbonyl compounds. The pigment causes cross-linking between protein chains in dry systems and in dilute solutions containing protein. The enzymatic digestibility of the protein (in vitro and in vivo) is thus reduced. Progress in research on the later steps of the browning reaction has been hindered because of the difficulty in purifying the pigments and by the fact that the color may result from more than one chromophore. The present article reports on a new approach to the solubilization, isolation, and purification of pigments and pigment-containing cross-links from a humidified protein-sugar browning reaction system. In addition, the authors describe some characteristics of the pigment. The reaction systems were derived from milk powder and casein-glucose.

(over)

0.34 (0.6)(2.06) FLAVOR PROBLEMS IN FOOD DEVELOPMENT AND THEIR CONTROL. PART I: FLAVOR AND ITS CHANGES

Katz, Morris H. (The Pillsbury Co., Minneapolis, Minnesota)
Food Product Development 4, No. 5, 44-45, 48-49, 104 (August-September 1970)

To identify the flavor problems that arise during development of a new food product, the food technologist must have a thorough understanding of the distinction between "flavor" and "flavoring." The term flavor refers not only to the sensation created by material taken into the mouth but to the characteristics of the material (the food, beverage, drug, etc., and its components) that produce the sensation. Flavor sensations are perceived principally by the senses of taste and smell; but they also are perceived by touch--for example, general pain or temperature. A "flavoring" is any single chemical entity of natural mixture that is added to materials taken into the mouth. The clearly predominant purpose and effect (a coupling of terms that indicates knowledgeable and intentional rather than inadvertant use) of this addition is to provide all or part of the particular flavor of the final product. These definitions and distinctions are a first step in development of the working, descriptive language required to establish the properties and attributes of the flavor being characterized or matched.

The author discusses factors that may effect considerable change, intentional or otherwise, in the flavor of foods: unflavored ingredients, nutritive components and inert ingredients, heat processing, mechanical processing, chemical and biochemical processes, and storage.

In the second (and final) part of the article, the author will discuss the function and effect of flavorings and how their effectiveness can be evaluated.

0.322 (1.81)(9.19)

HEMOLYMPH-FREE AMINO ACIDS AND RELATED NITROGENOUS COMPOUNDS OF CRASSOSTREA VIRGINICA INFECTED WITH BUCEPHALUS SP. AND MINCHINIA NELSONI

Feng, S. Y. (Marine Research Laboratory and Biological Sciences Group, University of Connecticut, Noank 06340), E. A. Khairallah (Biochemistry and Biophysics Section, Univ. Conn., Storrs 06268), and W. J. Canzonier (New Jersey Oyster Research Laboratory, Rutgers, The State University, New Brunswick 08903)
Comparative Biochemistry and Physiology 34, No. 3, 547-556 (June 1, 1970)

This report is a preliminary account of the variation of oyster hemolymph nonprotein nitrogenous compounds associated with geographic locations, parasitic infections, and seasons. It shows that 17 free amino acids and related amines are present in normal oyster hemolymph. Those in high concentrations are free taurine, alanine, glycine, and serine; those in moderate concentrations are phosphoethanolamine, β-alanine, ornithine, phosphoserine, arginine, lysine, and glutamic acid; those in low and trace amounts are leucine, isoleucine, γ-aminobutyric acid, aspartic acid, threonine, and methionine.

The total concentration and the composition of normal hemolymph-free amino acids and amines in the oysters varied with the season and the geographic location. The total free amino acids of normal Cape Shore oysters were consistently higher than those of infected oysters, regardless of season; the difference reached a minimum in winter. As a rule, a reduction of free alanine, glycine, serine, phosphoethanolamine, β-alanine, ornithine, arginine, lysine, leucine, and isoleucine in infected oysters was accompanied by increases in free taurine, aspartic acid, glutamic acid, threonine, and phosphoserine. [2 figures, 3 tables, 24 references]

LB

0.31 (8.53)(4.14)

EVIDENCE FOR THE EXISTENCE OF CHOLESTERYL ALK-1-ENYL ETHERS IN BOVINE AND PORCINE CARDIAC MUSCLE

Gilbertson, John R., Helga H. Garlich, and Rose A. Gelman (Department of Biochemistry and Nutrition, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pa. 15213)
Journal of Lipid Research 11, No. 3, 201-208 (May 1970)

This paper presents data establishing the existence of cholesteryl alk-1-enyl ethers as naturally occurring lipids. Evidence is given for the existence of cholesteryl alk-1-enyl ethers in bovine and porcine cardiac muscle. The ethers contain several different fatty chains, the major species have 16 and 18 carbon atoms. The cholesteryl alk-1-enyl ether concentration in the bovine cardiac muscle was 0.08 μmoles per 100 mg. of neutral lipid, and in the porcine cardiac muscle was 0.01 μmoles. [5 figures, 1 table, 19 references]

FTP

0.35 (0.38)

FACTORS INVOLVED IN CHANGES IN HEPATIC LIPOGENESIS DURING DEVELOPMENT OF THE RAT

Lockwood, Elizabeth A., E. Bailey, and C. B. Taylor (Department of Biochemistry, University of Sheffield, Sheffield S10 2TN, United Kingdom)
Biochemical Journal 118, No. 1, 155-162 (June 1970)

Previous workers have shown that marked changes in the conversion of carbohydrate into lipid in the liver of the rat occur during development of the animal. At the weaning time of the rat, when the milk diet is replaced with a high-carbohydrate-and-low-fat diet, there is a marked stimulation of lipogensis. Hormonal changes also occur during development of the rat. The rat, therefore, provides a useful natural system for study of the hormonal and dietary effects on changes in enzyme activity. The present paper reports on the development patterns of phosphofructokinase and aldolase (glycolytic enzymes), acetyl-CoA carboxylase (a key enzyme in lipogenesis), and NADP-dependent isocitrate dehydrogenase and extramitochondrial aconitrate hydratase (enzymes that may be associated with lipogenesis). In addition, the dietary and hormonal control of the observed developmental changes in enzymes associated with lipogenesis was studied.
[6 figures, 3 tables, 25 references]

FTP

0.33

The method for isolation and purification of protein-bound brown pigments formed in the protein-carbonyl browning reactions includes isoelectric washing of the protein, hydrolysis of the insoluble protein-bound pigment with proteolytic enzymes, and chromatographic purification of the solubilized brown pigment by gel filtration and ion-exchange chromatography. Visible spectroscopy of the purified pigments showed typical, featureless end absorption that became more intense as the wavelength decreased. The pigment was completely bleached with hot H_2O_2. The ultraviolet absorption spectra of the purified pigments were featureless, rising slowly to a weak shoulder around 270 nm. The infrared spectra gave only broad bands characteristic of proteins and sugars. The uncorrected fluorescent spectra were broad and changed shape with different excitation wavelengths. Trace metals do not appear to be important in the structure of the pigment. The elemental formula appears to be $C_{19}H_{30}N_3O_{16}$, indicating a fairly complex structure.

The authors conclude that, because the pigments do not appear to be single chemical entities, elucidation of their structure will be a long range research objective. Nevertheless, even a partial understanding of the structure of the pigments will greatly further our understanding of certain biological problems, for example those related to losses in the nutritive value of protein foods.
[5 figures, 1 table, 23 references]

0.38 (1.125)

ESTERASE POLYMORPHISMS IN THE SKIPJACK TUNA, KATSUWONUS PELAMIS

McCabe, Mead M., and David M. Dean (Laboratory for Quantitative Biology, Department of Biology, University of Miami, Coral Gables, Florida 33124)
Comparative Biochemistry and Physiology 34, No. 3, 671-681 (June 1, 1970)

The authors identify by starch gel electrophoresis five groups of tuna esterases on the basis of their migration rates, substrate specificities, and inhibitor sensitivities. They then evaluate each as a possible genetic tool for use in studying skipjack populations. [3 figures, 4 tables, 37 references]

LB

0.38

COMPARISON OF THE PARTIAL AMINO-ACID SEQUENCE OF DOGFISH TRYPSINOGEN WITH BOVINE TRYPSINOGEN

Bradshaw, Ralph A., Hans Neurath, Ross W. Tye, Kenneth A. Walsh, and William P. Winter (Department of Biochemistry, University of Washington, Seattle)
Report dated January 26, 1970, 4 pp. Prepared for the Office of Naval Research, Washington, D.C.
U.S. Government Research & Development Report 70, No. 17, 41 (September 10, 1970)

Trypsinogen molecules from two species of different evolutionary periods are compared. Homology has been established by the sequencing of over half the amino acids of the dogfish enzyme. Reprinted

Available from the Clearinghouse for Federal Scientific and Technical Information, 5285 Port Royal Road, Springfield, Virginia 22151. Report AD-708 833.

0.38 (9.13) GENETICS OF MULTIPLE LACTATE DEHYDROGENASE ISOZYMES IN MUSCLE TISSUE OF LAKE WHITEFISH (COREGONUS CLUPEAFORMIS)

Clayton, J. W. (Fisheries Research Board of Canada Freshwater Institute, Winnipeg 19, Manitoba), and W. G. Franzin (Department of Zoology, University of Manitoba, Winnipeg 19)
Journal of the Fisheries Research Board of Canada 27, No. 6, 1115-1121 (June 1970)

This paper reports on a study of the multiple muscle LDH (lactate dehydrogenase) isozymes in lake whitefish (Coregonus clupeaformis). Electrophoresis of extracts of the red lateral line muscle revealed two groups of LDH isozymes. The faster moving set of isozymes predominated in the heart tissue extracts; the slower moving set of isozymes predominated in the white muscle extracts.

The researchers found three phenotypes of heart-type LDH isozymes in wild fish. (The fish were from Clear Lake and Lake Athapapuskow in Manitoba.) Breeding experiments (carried out to establish the genetics of lake whitefish LDH) showed that there were two nondominant alleles at the locus coding the most anodal of the heart-type LDH subunits. The frequency of these alleles was different in the fish from the two lakes.

The researchers state that their observations regarding the presence of discrete sets of multiple LDH isozymes in lake whitefish and the independent genetic control of isozymes within each set provide additional evidence for the probable tetraploid nature of salmonids.
[3 figures, 2 tables, 21 references]

0.4 (0.7) LONG CHAIN FATTY ACID FORMATION: KEY STEP IN MYELINATION STUDIED IN MUTANT MICE

Baumann, N. A., M. L. Harpin, and J. M. Bourré (Laboratoire de Neurochimie, Clinique des Maladies du Système Nerveux, Hôpital de la Salpêtrière, Paris 13ème, France)
Nature 227, No. 5261, 960-961 (August 29, 1970)

Myelin, the most stable membrane known, contains 10 times as much long chain sphingolipid as any other known membrane structure. Some researchers have suggested that the long chain fatty acids (>18 carbon atoms) in the sphingolipids are involved in the stability of myelin. Previous workers reported the finding of a myelin-deficient mouse mutant whose galactolipids and sphingomyelin lacked long chain fatty acids. As a result of this observation, the present workers investgated whether the elongation of long chain sphingolipid molecules is a key step in myelin formation. They compared the histological and biochemical events related to myelination in normal and in myelin-deficient mutant mice. They found that in the normal maturation process leading to adult myelin, the appearance of fatty acids with 24 carbon atoms follows the appearance of cerebrosides and sulfatides. [1 table, 18 references]

0.4 (0.7)(4.91) BRAIN FATTY ACID ELONGATION AND MULTIPLE SCLEROSIS

Yatsu, Frank M., and Sylvia Moss (Department of Neurology, University of California Medical Center, San Francisco, California 94122)
Nature 227, No. 5263, 1132-1133 (September 12, 1970)

Earlier workers suggested that elongated fatty acids in the brain may contribute to membrane stability and cohesiveness. In the present study, the developmental pattern of fatty acid elongation in the rat brain was examined. The findings show that the pattern of fatty acid elongation changes with brain growth and development, and reaches its maximum rate during myelination. In the younger brains, the mitochondria synthesize primarily the longer chain fatty acids (particularly $C_{22:4}$ at 39.3%); whereas in the older brains they synthesize primarily the shorter chain fatty acids (particularly $C_{18:0}$ at 17.7% and $C_{20:1}$ at 15.3%). The authors suggest that their findings of a distinctive developmental prominence of $C_{20:1}$ and $C_{22:4}$ fatty acids support the view that changes in early human brain growth and development, specifically the synthesis of $C_{22:1}$, influence eventual predisposition and development of multiple sclerosis. [6 references]

0.5 RELATION OF THE HEAT RESISTANCE OF SALMONELLAE TO THE WATER ACTIVITY OF THE ENVIRONMENT

Goepfert, J. M., I. K. Iskander, and C. H. Amundson (Food Research Institute, Department of Bacteriology, and Department of Food Science, University of Wisconsin, Madison 53706)
Applied Microbiology 19, No. 3, 429-433 (March 1970)

As part of a larger study of the behavior of salmonellae in dry and semidry environments, the authors measured the influence of water activity (a_w) on the heat resistance of salmonellae. Such information would help establish whether there is any correlation between a_w and heat resistance regardless of the chemical composition of the test environment. Eight strains of salmonellae (Salmonella infantis, S. alachua, S. typhimurium, S. anatum, S. anatum GF, S. montivedeo, S. senftenberg 775W, and S. tennessee) and one of Escherichia coli were studied. The test solutions were prepared in 0.01 M phosphate buffer at pH 6.9. The amount of sucrose and glycerol necessary to achieve the desired a_w levels were derived from the data of Scott (1957); that of fructose and sorbitol, by the method of Norrish (1966).

Apparently, heat resistance of salmonellae is not dependent on the a_w of the environment alone. The heat resistance of the salmonellae increased as the a_w of the heating menstruum was reduced. Sucrose gave a greater degree of protection to the bacterial cells than did fructose, glycerol, and sorbitol. No correlation could be established between a_w and heat resistance of the salmonellae over the

(over)

0.4 SATELLITE DNAs IN CRUSTACEA: TWO DIFFERENT COMPONENTS WITH THE SAME DENSITY IN NEUTRAL CsCl GRADIENTS

Skinner, Dorothy M., Wanda G. Beattie, and Marilyn S. Kerr (Biology Division, Oak Ridge National Laboratory), and Dale E. Graham (University of Tennessee, Oak Ridge Graduate School of Biomedical Sciences, Oak Ridge, Tennessee 37830)
Nature 227, No. 5260, 837-839 (August 22, 1970)

This article describes the satellite DNAs in five species of Crustacea (land crab, Gecarcinus lateralis; blue crab, Callinectes sapidus; spider crab, Libinia dubia; Jonah crab, Cancer borealis; lobster, Homarus americanus). Previously, other workers have reported on the satellite DNAs in the Jonah crab (Sueoka, 1961), in the mouse (Kit, 1961) and for a number of animal species, vertebrate and invertebrate. [2 figures, 1 table, 18 references] FTP

0.5

range of a_w levels (0.99, 0.96, 0.93, 0.90, 0.87, 0.75) studied. The strains of salmonellae showed variation in the magnitude of the increase in heat resistance as the a_w level was reduced. As the environment became drier, seven of the strains showed a greater increase in heat resistance than did S. senftenberg 775W.

Although it was not possible to draw broad conclusions regarding the relative heat resistance of the general Salmonellae and Escherichia (only a single culture of the latter was used), the data indicate that a heat treatment sufficient to destroy E. coli may not be sufficient to inactivate all serotypes of salmonellae. [3 tables, 8 references]

0.5 AN AUTOMATED MICROBIAL COLONY COUNTER

Collins, Herbert M. (American Instrument Company, Silver Spring, Maryland) Bulletin of the Parenteral Drug Association 24, No. 4, 205-208 (July-August 1970)

This article describes a unique, new, commercially available colony counter that is extremely rapid and that can count colonies after very short incubation times of the cultures. By this method, glass capillary tubes containing microbial cultures are automatically moved longitudinally through a light beam focused in a manner that light striking the colonies within each capillary are scattered onto a photodetector, the photoelectric signals are discriminated with an amplitude discriminator and the number of light pulses is printed onto paper tape. The incubation time of the culture is reduced by a factor of four or more. Less than 2 seconds is required to make colony counts and a printed record is made for each culture. [2 references] FTP

0.38 (0.4)(1.8) COMPARATIVE CARBOHYDRASE ACTIVITIES OF SOME CRUSTACEAN TISSUE AND WHOLE ANIMAL HOMOGENATES

Telford, Malcolm (Department of Zoology, University of Toronto, Toronto 5, Canada)
Comparative Biochemistry and Physiology 34, No. 1, 81-90 (May 1, 1970)

The comparison presented in this paper arose from the author's search for a source of trehalase--if this enzyme could be found in large amounts, it could be exploited for blood trehalose determinations. He found the range of carbohydrase activities for 11 species, representing 5 orders, of crustacea and determined specific activities as mg. glucose released from substrates/mg. protein/hr. for homogenates of 9 of the species. He detected no evidence of cellulose activity in any of the species, though several possessed a potent cellobiase and all showed some β 1-3 glucanase activity. Only for amylase from the crayfish Orconectes virilis did he try to determine the effect of pH and salts. For this crustacean, he found that the pH optimum for amylase was between 5.9 and 6.3 and the halion optimum was 0.1 M chloride. Trehalase activity was exhibited by all species. Work on isolating the enzyme is continuing. [4 tables, 22 references] LB

0.39 (9.3) DISC GEL ELECTROPHORESIS OF BLOOD SERA AND MUSCLE EXTRACTS FROM SOME CATOSTOMID FISHES

Huntsman, Gene R. (Bureau of Commercial Fisheries Center for Estuarine and Menhaden Research, Beaufort, North Carolina 28516)
Copeia, No. 3, 457-467 (September 3, 1970)

Disc gel electrophoretic analyses of the blood sera and the muscle extracts of 12 species of catostomids revealed that (1) muscle extract patterns of all but two of the species are quantitatively distinct; (2) sex of the fish makes no observable difference in the pattern; (3) in some instances, the patterns of fish of the same species but from different areas are quantitatively different. From this last finding, the author concludes that electrophoresis of muscle extracts might be a useful means of differentiating racial stocks. Blood serum patterns were too variable for taxonomic identification. LB

[6 figures, 3 tables, 28 references]

0.5 THE MICROBIOLOGY OF DRIED FOODS. PROCEEDINGS OF THE SIXTH INTERNATIONAL SYMPOSIUM ON FOOD MICROBIOLOGY (6.132)

Kampelmacher, E. H., M. Ingram, and D. A. A. Mossel (eds.) (International Association of Microbiological Societies, Committee on Food Microbiology and Hygiene)
Bilthoven, The Netherlands: International Association of Microbiological Societies (National Institute of Public Health, Utrecht, The Netherlands) vii + 528 pp. (1969)
Food Science and Technology Abstracts 2, No. 6, 745, 6B41-2 (June 1970)

This book contains the papers that were read at the subject symposium and the discussions that followed each reading. Included were:

"Fish Meal and Its Bacteriological Problems" (pp. 446-453), by S. Hauge [3 references], and "Evaluation of the Sanitary Condition of Fish Meal by Methods Applicable in Control of Production" (pp. 480-495), by M. T. F. de Zubiate, S. Hoces, and J. Zubiate. [43 references]

Also included were "Comparative Studies on the Isolation of Salmonellae From Dry Feed Ingredients" (pp. 193-209), by M. van Schothorst and E. H. Kampelmacher [25 references]; "Enumeration of Clostridium perfringens in Dried Foods and Feeding Stuffs" (pp. 243-278), by R. G. A. Sutton and B. C. Hobbs [14 references]; "Occurrence, Significance, and Testing Method for Aflatoxins in Dehydrated Foods and Feeds" (pp. 286-300), by H. K. Frank [20 references]; and "The Significance of Documented and Suspected Contaminations of Dehydrated Foods and Feeds" (pp. 167-177), by B. O. Ward [6 references]. LB

0.6 ÅRSREDOGÖRELSE 1968-1969 [ANNUAL REPORT, 1968-1969]

Anonymous
Swedish Institute for Food Preservation Research (Svenska Institutet för Konserveringsforskning, Fack, S-400 21 Göteborg 16, Sweden) SIK Report No. 260, 67 pp. (1969) (In Swedish with English text)

Among the research projects at the Institute are those described below.

Seven concerned with flavors and aromas, including: "aroma changes in frozen cod" (E. von Sydow and J. Andersson), defining the changes that occur during storage and devising methods and equipment for assessing the aroma of protein-containing foods; "aroma formation at heat treatment of protein-containing foods" (E. von Sydow and T. Persson), devising methods for coordinating physicochemical and sensory analyses of the aroma properties of protein foods and for attaining desirable aromas in protein-containing processed foods; "electrophysiological determination of intensity of odoriferous substances" (E. von Sydow and J. Andersson), determining whether frog olfactory epithelium or other biological material can be used as an indicator during gas chromatographic analysis of aroma complexes, thereby obtaining information about the quantitative contribution of different compounds to the total aroma of a product.

Three concerned with food rheology: "general rheology" (B. Drake), developing and testing unconventional methods for analyzing and controlling the rheological properties of food; "methods using penetrometers" (B. Drake and G. Kaudern), investigating new ideas for the construction of the compression tools to be used in the rheological analysis of food containing textured proteins; and "simplified determination of consistency" (B. Drake), developing methods for grading the consistency of such foods as soup, hamburger, and marmalade.

0.8 MATERIALS FOR THE SEA
(2.117)

Taylor, Donald M., et al.
Ocean Industry 5, Nos. 7, 8, and 9 (July, August, and September 1970)

Part 1. [Introductory article], by Donald M. Taylor (Editor, Ocean Industry), pp. 23-27 of July issue)

This first part of the series introduces the problems brought on by long submergence in the sea at different locations and depths. It also describes the work being done at the Submersible Test Unit, Naval Civil Engineering Laboratory (NCEL), Port Hueneme, California, on acrylic submersible spheres, such various metals as aluminum alloys and stainless steel, unreinforced concrete, and ferro cement. [11 photographs]

Part 2. Acrylic Plastic Design, by J. D. Stachiw (NCEL) (pp. 55-56, 59-60, 63 of August issue)

Transparent acrylic plastic submersibles permit man to use his vision underwater--a most important capability in exploration and exploitation of hydrospace. However, the great pressure differential imposed on the hull of the submersible presents a major challenge to the designer. He can generally ignore other types of loading, with the possible exception of point impact loading, since a structural member that can withstand the high differential loading imposed by depth can almost invariably withstand the hydrodynamic and gravity loading imposed during surface operations. This part of the series discusses the current state of
(over)

0.9 OPPORTUNITIES IN THE SEA.
(9.11)(1.01)

Ocean Industry 5, No. 8, 22-27 (August 1970)
Card A
Forecast of World Ocean Objectives...and When They Will Be Reached, by D. L. Stover (Ocean Marine Products, Inc.), pp. 22-26.

In general terms, our long-range goals in the ocean are--or should be--to improve the ocean environment, to promote economic development of ocean resources, to increase scientific knowledge of the ocean, to ensure world peace and security, and to enhance international understanding. These goals can be reached through attainment of a multiplicity of discrete and related objectives. The author spells these objectives out on a three-column chart that covers time periods up to the year 2000. The chart forecasting world ocean objectives is divided according to the major ocean interfaces: aerospace, surface, subsurface, bottom, and policy and support.

Aerospace objectives. The earth orbit stations that will be established during the early 1970's will lead to improved weather forecasting and more precise navigation. The feasibility of using the stations for surveys of fish populations and other resources will be determined. World resources and environmental conditions will be monitored from space during the latter part of the century.

Surface objectives. The immediate considerations concern the multiple use of the coastal zone. By 1985, large ocean-going vehicles developed as a result of the Surface Effect Ship program may be the major means of transportation in
(over)

0.9 OPPORTUNITIES IN THE SEA.
(9.11)(1.01)

Ocean Industry 5, No. 8, 22-27 (August 1970)
Card B
New Slant on the Economy of Manganese Nodules, by Gale L. Hubred (Department of Material Science and Engineering, University of California, Berkeley), pp. 26-27.

A manganese-nodule mining firm has released information confirming the author's theory that a current manganese-recovery venture would have a pay-off time of less than 3 yr. The theory is based on recent evaluations of the high cobalt, copper, and nickel content of manganese nodules. A table is given showing world production of these four metals, plus iron, in 1967 and comparing figures for that production with those for Mn nodule deposits, accumulation rate, and potential production from a 1,800,000 ton/yr. mining operation. Another table gives an economic breakdown of capital and operating expenses ($230 and $85 million, respectively), of gross revenue and net yearly income ($168 and $83 million, respectively), and of payoff time (2.8 yr.) and return on investment (36%).

Several factors point to an even more favorable economic situation in the future: depletion of competitive ore deposits, expected decrease in recovery costs, and the operating stability offered by the unvarying nature of the deep-ocean environment. However, at least two major problems are apparent: (1) possession and protection of the mining site have not been defined and (2) the market might not be able to support more than one firm producing at this level. [1 figure, 2 tables, 8 references]

0.8

material technology (material grades, behavior, and fabrication), and describes acrylic plastic structures for hydrospace use (windows and seals, including sample design problems). [4 figures, 2 tables, 2 photographs]

Part 3. Acrylic Plastic Design (continued) (pp. 99-101 of September issue)
Continuing the discussion begun in Part 2, Dr. Stachiw next considers the design of pressure hulls--the two most important design considerations (the effect of viscoelastic deformation on elastic stability and the avoidance of tensile stresses to keep scratches or notches in the hull from lowering its impact strength), the construction of the hull, the factors affecting operational depths, and the shape of the hull (specifically, nonspherical shapes). [4 figures, 3 photographs, 8 references]

0.8 DESIGN AND EVALUATION OF A SYSTEM FOR THERMAL DECONTAMINATION OF PROCESS AIR (0.12)

Chatigny, M. A., A. A. Sarshad, and G. F. Pike (Naval Biological Laboratory, University of California, Oakland 94625)
Biotechnology and Bioengineering 12, No. 4, 483-500 (July 1970)

A system for thermal decontamination of air contaminated with pathogenic microorganisms has been devised and tested at the authors' laboratory. The system uses a natural-gas burner to heat the exhaust air to over 750° F. It reduces the number of aerosolized viable spores by more than 8 logs at design flow rates. The annual cost of owning and operating the system is about $9,000.

[7 figures, 2 tables, 8 references] LB

0.8 STIRRING UP THE OCEANS FOR PROFIT
(9.16)

Lawes, Glen, and Michael Kenward (editors)
New Scientist 47, No. 715, 378 (August 20, 1970)

In August, deep ocean water began flowing through a mile-long 3.5-in.-diameter pipeline into closed ponds built on the shore at St. Croix, Virgin Islands. The flow signaled completion of one part of the National Science Foundation's Sea Grant Program to increase the use of the ocean's resources. It was the first step toward eventual use of deep-ocean water for mariculture, the generation of electric power, and the production of fresh water.

Theoretically the system will work essentially as follows. Ocean water, at a temperature of 5° C., will be pumped through condensers set in the path of highly humid trade winds. When the moisture-laden air is cooled, much of the humidity will condense and be recoverable as potable water. Meanwhile, the temperature difference between the deep water and the surface water (from 19° to 25° C.) will be used to generate power. In a process already used by the French in Cuba and the Ivory Coast, the temperature of the warm surface water in a partial vacuum is used to generate low-pressure steam. The steam is condensed in a chamber cooled by the deep water; a turbine placed between the evaporator and the condenser is turned by the steam. Finally the deep-ocean water, with its dissolved phosphate and nitrate nutrients, will be piped into the ponds or lagoons that are to be used for mariculture.

Eventually, it is hoped, artificial upwelling may be created in tropical waters where the scarcity of nutrients from deeper levels militates against a viable fishery. LB

0.6

Two concerned with sensory evaluation: "sensory evaluation methods" (B. Drake and Birgit Johansson), reporting the compilation of a bibliography containing about 2,000 references to articles and books published from 1950 to 1968; and "subjective evaluation of aroma" (B. Drake, E. von Sydow, Birgit Johansson, and K. B. Döving), describing correlations between odor intensity and corresponding electrophysiological data for selected substances.

Three concerned with fat oxidation, all by R. Marcuse: "kinetics of fat oxidation in dry systems," showing the importance of oxygen-diffusion rate in preventing food from becoming rancid; "methods for measuring oxidative rancidity," developing accurate methods for qualitative and quantitative definition of oxidative rancidity so that suitable protective measures can be taken; and "the dependence of products of fat oxidation on oxygen pressure," investigating how oxygen pressure influences the type of oxidation occurring in air or at low oxygen pressure.

Three concerned with microorganisms: "germination of bacterial spores" (B. G. Snygg), attempting to find a less severe heat or radiation treatment, or a combination of the two, to preserve foods; "resistance of bacterial spores" (B. G. Snygg and G. Härnulv), investigating the effect of freeze-drying on heat and radiation resistance of 10 bacillus species; and "fat-splitting microorganisms" (B. G. Snygg, N. Molin, and Margareta Fall), investigating the composition, importance, and physiological characteristics of fat-splitting food microflora.

Four concerned with freezing and heating: "new methods for ultrafast freezing of foods" (N. Bengtsson and B. Jakobsson), "structural changes during cold storage" (A. Liljemark and L. Jarenbäck), "radio frequency heating of foods" (N. Bengtsson), and "freezing and heating experiments with meat and gravy" (N. Bengtsson and B. Jakobsson). [2 figures, 2 tables, 21 publications]

0.9

commuter areas, in Alaska as support for oil operations, and in the Caribbean for moving passengers and cargo. By 1985, the World Weather Watch should have advanced to the stage that allows initial sea-state control.

Subsurface objectives. These objectives are tied to the political, sociological, and technological development of independently operating submersibles--research, salvage, fishing, mining, and transport vessels. By 1985, large submersible systems will be processing both plants and animals at sea, and manganese mining from the shallow parts of the ocean basins will be routine.

Bottom objectives. These objectives concern mining and oil production. The author mentions some of the sea-floor production systems already designed and built by several U.S. industries; sites the present and future offshore oil productive regions; and discusses manned continental-shelf and sea-mount stations, ocean-ridge and deep-ocean explorations, and complete underwater resorts.

Policy and support objectives. The author recalls the recommendations contained in the report of the Marine Science Council and Commission on the six national projects that should be started immediately. Then he discusses each of the five other national projects that the report suggests feasibility studies should be made of: establishment of science and engineering information centers, extension of the Sea Grant Program, establishment of an international sea bed registry, pollution control and environment improvement, and extraction of low-cost products from the sea. [4 figures, 1 chart]

(Continued on Card B)

1.013 THE FISHERY RESOURCES OF VENEZUELA AND THEIR EXPLOITATION

Simpson, John G., and Raymond C. Griffiths (FAO)
Resources and Fishery Exploitation Series 1, No. 5, 172-206 (1967) (In Spanish and English) (República de Venezuela, Ministerio de Agricultura y Cría, Investigaciones Pesqueras)

Venezuela has relatively productive seas along its 2,800 km. of coastline and over its 90,000 km.^{2} of continental shelf; this productivity is promoted by the trade winds which cause upwelling. About 40,000 Venezuelans earn their living by fishing, and 200,000 fish part-time for subsistence.

In western Venezuela there is a trawl fishery for shrimps, "corbinas", croakers and mullets. In central Venezuela, which has little continental shelf, there is less coastal fishing, but lobsters, tunas and other fish are landed. In eastern Venezuela there is a large beach-seine fishery for sardines and anchovies, and a longline fishery lands tuna from the Caribbean and western Atlantic.

Inland there are extensive fisheries for shrimp, in Lake Maracaibo, by beach seine, and for catfish, "dorado" and "cachama", by nets and traps, along the Orinoco especially around growing industrial centers.

The Ministry of Agriculture has begun to study the commercial fisheries resources by modern methods.

[3 figures, 6 tables, 22 references]

Authors' abstract

1.12 (1.013) (1.0119) A PRELIMINARY STUDY OF THE FISHERY FOR YELLOWFIN AND ALBACORE TUNA IN THE CARIBBEAN SEA AND WESTERN ATLANTIC OCEAN BY LONGLINERS FROM VENEZUELA

Griffiths, Raymond C., and Takeshi Nemoto (Ministerio de Agricultura y Cría, Carcas, Venezuela)
Resources and Fishery Exploitation Series 1, No. 6, 207-274 (1967) (In Spanish and English)

The purpose of this paper is to describe briefly the growth and the scientific investigation of tuna longline fishing in Venezuela, to present a first analysis of the available fishery statistics, and to outline prospects of this fishery within the framework of the current multinational exploitation of an oceanwide resource. The fishery and the investigation are similar in many ways to the fishery for these same tuna by Japanese longliners operating out of Brazil (Rodrigues Lima and Wise, 1962).

The study is based on limited but excellent data from three Japanese tuna longliners owned and operated by a Venezuelan-Japanese company. Two indices of abundance are calculated, one weighted by the number of one-degree rectangles fished, the other not. The ratio of these two is computed to give an index of concentration. The indices are computed for yellowfin and albacore, the two principal species, and for the eastern Caribbean and the western Atlantic, the two principal fishing areas. All are computed quarterly for the years 1960 to 1963.

(over)

Reprinted in part

1.017 (1.12) RESEARCH RESULTS INDICATE GOOD PROSPECTS FOR SUCCESSFUL EAST COAST TUNA INDUSTRY

Anonymous
Commercial Fishing 9, No. 6, 8-9, 11 (June 1970)

When the amount of dairy farming along the northeast coast of New Zealand's North Island declined to levels that made operation of the Te Kaha creamery uneconomic, the dairy cooperative formed an association with the local fishermen. Plate freezers were installed in the butter-churn room and some of the plant was turned over to processing rock lobster tails. But then the rock lobster beds around New Zealand, because of depletion of the resource, began to give increasingly fewer lobsters. So again the cooperative was in economic trouble. And again they investigated the possibility of diversifying--this time into the possibility of growing, processing, and marketing tamarillos and of catching and processing tuna.

This article describes some of the research the Marine Department is conducting, assisted by the Whakatane lobstermen and their small craft, into safely and economically catching tuna from the smallest commercial fishing craft. For example, they have found that tossing live bait out near a school of feeding skipjack and rowing a dinghy (under which the bait takes cover in order to escape the tuna) toward a set net will lead the skipjack into the net. By throwing more bait fish overboard as soon as the skipjack reach the net, the tuna will stay interested in feeding until most of them are enmeshed. They have also found that

(over)

LB

1.85 (0.36)(9.19) (2.1127) SPONTANEOUS NECROSES IN MUSCLES OF BROWN SHRIMP, PENAEUS AZTECUS IVES

Rigdon, R. H. (Department of Pathology, University of Texas Medical Branch, Galveston 77550), and Kenneth N. Baxter (Bureau of Commercial Fisheries Biological Laboratory, Galveston)
Transactions of the American Fisheries Society 99, No. 3, 583-587 (July 1970)

Brown shrimp caught in trawls in Galveston Bay and kept in poorly aerated tanks frequently have focal, light-colored areas of varying size and number in the muscle segments of the abdomen. Sometimes, when the distal segments of the abdomen are involved, the segments become progressivly softer and scale off. Histologically, these light-colored areas are degenerated foci of striated muscle. In the initial stages, the lesion may be reversed by placing the shrimp in well-aerated tanks; on the other hand, it may progress to necrosis. When muscular involvement is extensive, the shrimp may die within from 18 to 24 hr. Since the mortality rate of shrimp kept for bait is high, this muscle necrosis is of economic importance.

Laboratory tests indicated the discoloration in shrimp muscle was related to water temperature, decreased oxygen content of holding-tank water, stress, or a combination of the three. Since some shrimp have the same type of discoloration immediately after being caught in the Bay, the authors are studying the possible role of water pollution and toxicity in this apparently metabolic reaction. They are also analyzing the chemical and enzymatic changes that may be occurring in the muscle. [5 figures, 1 reference]

LB

1.017

strands of wool obtained from a knitting mill are better lures than are the $7-a-time plastic lures used by the Japanese. Pinks and reds with a few strands of yellow are best for bright days; browns and dark blues for dull days. The ex-lobstermen use from 10 to 15 strands on double barbless hooks with the wool trailing from the eye of the hook to a point an inch beyond the end of the hook. During one day's experimental fishing they caught 300 tuna with these wool lures.

Although throughout the tuna season sea-surface temperatures of about 80° F. kept the skipjack from schooling on the surface for more than a few minutes at a time and drove the albacore as far south as Fiordland, the small boats did well during the trials, catching over 90,000 lb. of tuna. The Marine Department's tuna research officer concludes that tuna fishing will be a good off-season activity for New Zealand's rock lobster fishermen.

1.33 (0.6) SPORTSMAN'S GUIDE TO HANDLING, SMOKING, AND PRESERVING GREAT LAKES COHO SALMON

Dudley, Shearon, J. T. Graikoski, H. L. Seagran, and Paul M. Earl (Bureau of Commercial Fisheries Technological Laboratory, Ann Arbor, Michigan 48107)
U.S. Fish and Wildlife Service, Circular 346, iv + 26 pp. (September 1970)

Since the introduction of coho salmon in Lake Michigan in 1966, little information on the proper care and use of the Great Lakes variety of this fish has been made available to the sportsman. This pamphlet gives guidelines for cleaning, butchering, cooking, or storing coho. Emphasis is placed on smoking procedures--one of the more popular ways of preparing coho. The use of these guidelines will help the sportsman prepare satisfactory products.

[23 figures, 9 references] Authors' abstract

1.85 REPORT OF THE BUREAU OF COMMERCIAL FISHERIES BIOLOGICAL LABORATORY, GALVESTON, TEXAS FISCAL YEAR 1969

Lindner, Milton J., and Robert E. Stevenson (Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas)
U.S. Fish and Wildlife Service, Circular 343, iv + 39 pp. (August 1970)

Progress of research is reported. Emphasis is on shrimp, and the research involves the fields of maticulture, population dynamics, ecology, and oceanography.

[28 figures, 9 tables, 16 publications] Authors' abstract

1.85 SYNOPSIS OF BIOLOGICAL DATA [ON PRAWNS]

Kirkegaard, I. (N.T.A. Primary Industry Branch, Fisheries Section, P.O. Box 231, Darwin, N.T. 5790, Australia), and R. H. Walker (CSIRO Division of Fisheries and Oceanography, P.O. Box 21, Cronulla, N.S.W. 2230, Australia)
Division of Fisheries and Oceanography, Commonwealth Scientific and Industrial Research Organization, Cronulla, Sydney, Australia (1970)

ON THE RAINBOW PRAWN PARAPENAEOPSIS SCULPTILIS (HELLER, 1862); DFO/S4, viii + 28 pp. [5 figures, 5 tables, 24 references]

ON THE SCHOOL PRAWN METAPENAEUS MACLEAYI (HASWELL, 1879); DFO/S5, viii + 22 pp. [4 figures, 2 tables, 12 references]

Included in these formula synopses are sections on distribution, nutrition and growth, behavior (migrations, schooling, and response to stimuli), exploitation (fishing equipment, areas, seasons, operations, and results), and protection and management.

LB

1.121 (9.12) APPARENT ABUNDANCE, DISTRIBUTION, AND MIGRATIONS OF ALBACORE, THUNNUS ALALUNGA, ON THE NORTH PACIFIC LONGLINE GROUNDS

Rothschild, Brian J., and Marian Y. Y. Yong (Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii 96812)
U.S. Fish and Wildlife Service, Special Scientific Report--Fisheries No. 623, vi + 37 pp. (September 1970)

This paper considers the dynamics of albacore, Thunnus alalunga, on the Japanese North Pacific longline grounds. In addition to changes in apparent abundance and distribution, the modes of immigration and emigration from the longline grounds are considered in terms of the migratory route of the albacore in the North Pacific Ocean. The data show a clear decline in apparent abundance on the longline grounds during the 1949-61 study period. This decline could not be related to changes in the average size of the fish or fishing effort. Spatial statistics were computed to describe the distribution of the albacore on the longline grounds. These show very clear cyclical changes each year. These changes reflect a net southwest movement of the two-dimensional first-moment at a velocity of about 6.5 miles (12 km.) day^{-1}. The second order spatial statistics showed a maximum longitudinal expansion and latitudinal contraction during the peak of the fishing season. The time-space coordinates of the two-dimensional first-moment of the albacore distribution appear to be highly predictable. The migration route of the albacore among North American, pole-and-line, and longline fisheries is considered. It appears that the dynamically most significant movement of albacore is from the North American fishery, to the pole-and-line fishery, to the longline fishery.
[19 figures, 5 tables, 31 references] Authors' abstract

1.12

The yellowfin appear to have a two-year cycle of abundance in the Caribbean, and a one-year cycle in the Atlantic. The albacore appear to have a one-year cycle in both oceans. The concentration index tends to have a one-year cycle. Quarterly catch rates are from about 1 to 8% for yellowfin and up to 2% for albacore.

The results are compared with similar ones from the Brazilian tuna fishery. The problem and prospects of the fishery are discussed in general terms.
[63 figures, 2 tables, 12 references]

1.87 SOUMEN RAPUKYSYMYS
(1.0144) (9.15) [SUMMARY: CURRENT PROBLEMS IN CRAYFISH IN FINLAND]

Westman, Kai, Olli Sumari, and Harri Dahlström (Bureau of Fisheries Investigation, Fabianinkatu 32, Helsinki 17, Finland)
Soumen Kalastuslehti 75, No. 2, 28-30, 86-88 (1968) (In Finnish; English summary)

The crayfish fungus Aphanomyces astaci (Schikora) has so devastated the Finnish crayfish population that exports have fallen from 15,500,000 crayfish in 1900 to about 400,000 in 1966. Despite regulatory statutes and ecological, physiological, and pathological studies, no effective method of preventing the plague has been devised. In 1967, 3,000 American crayfish (Pacifastacus leniusculus, Dana) were imported from California. According to several Swedish researchers, the American species is naturally resistant to Aphanomyces, grows and reproduces well, and has a flavor equal to that of Astacus. The Finnish Bureau of Fisheries Investigation (Board of Agriculture) has begun investigations of the growth, activity, nutritional requirements, and behavior of the species in both natural and hatchery environments. [2 figures, 22 references]

2.111 ROPES--ADVANCING TECHNOLOGY

Bowbeer, Arthur
World Fishing 19, No. 6, 80 (June 1970)

The author reports on the first of a planned series of conferences on the latest trends in marine rope technology. The number-one enemy of wire rope is not corrosion but kinking, acute bending, chafing, and general abrasion--all of which are manifestations of maltreatment. Suggestions for preventing or correcting the results of maltreatment are made. Most important is the need for very close cooperation at an early stage between the designers of new fishing equipment and the designers of the rope that will be used with it.

A rope that the author considers quite representative of modern technology is described. It consists of a braided nylon sheath over a braided nylon core, inner and outer components sharing the load equally. It is claimed to be 12% stronger on a size-for-size basis than its three- or eight-strand counterparts. It is very flexible, is easily handled wet or dry, is nonrotating, and is the least extensible of manmade-fiber ropes. It will not kink or seize. In spite of its complex structure, it splices readily. Its only disadvantage, apparently, is its higher initial cost.

1.88 FREEZING TOLERANCE IN MYTILUS EDULIS
(1.82)(9.13)
(9.16)

Williams, Robert J. (Naval Medical Research Institute, Bethesda, Maryland 20014)
Comparative Biochemistry and Physiology 35, No. 1, 145-161 (July 1, 1970)

The purposes of the investigation reported here were (1) to establish the freezing tolerance of the intertidal Mytilus relative to that of the subtidal clam Venus mercenaria, (2) to determine the effect of adaptation to altered salinities on freezing tolerance, and (3) to establish whether the tolerance of Mytilus is the result of an elevated concentration of intracellular solute, perhaps amino acids, acting colligatively.

The study showed that Mytilus can tolerate freezing to a tissue temperature of -10° C.; Venus tolerates freezing to only -6° C. The tissues of both are injured when 64% of the tissue water has been removed as ice. This finding agrees with the hypothesis advanced by previous investigators that freezing injury results from the removal of a maximum tolerated proportion of cell water with the accompanying reduction in cell volume to a minimum tolerated level, regardless of the absolute concentration or constitution of the solutes involved. In Mytilus, 20° of the cell water appears to be osmotically inactive; thus, lower freezing temperatures are required to remove 64% of the intracellular water.

Adapting Mytilus to 150% salinity increased the freezing tolerance to -15° C.; lower salinities reduced the freezing tolerance. The amount of osmotically
(over)

2.1123 QUICK RELEASE BRANCHLINE CLIP DEVELOPED FOR LONGLINING
(2.1473)

Corbett, Michael G. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Gloucester, Massachusetts 01930)
Commercial Fisheries Review 32, Nos. 8-9, 50-53 (August-September 1970)

This article describes the details of the construction and use of a longline auto-clip for the automatic or manual attachment or detachment of branchlines and buoylines. It has these features: (1) mechanical attachment and detachment from moving mainline, (2) capacity for simple alternate manual operation when necessary, (3) nonslippage of branchline along mainline, (4) a design suitable for further development of a fully automated longline fishing operation, (5) strength equal to or greater than other longline components, (6) positive holding of branchline(s) with fish to mainline, and (7) simple fabrication by conventional techniques.

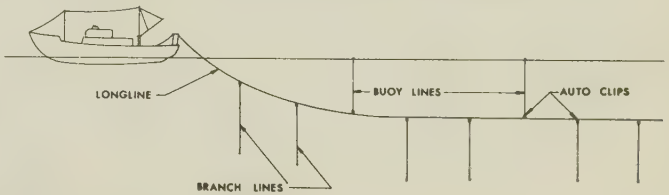


Fig. - Typical longline operation

(over)

1.88

inactive water or the dehydration limit was not affected by the increased salinity. Changes in freezing tolerance following adaptation to altered salinity are apparently unrelated to the basic freezing tolerance. The alteration in amino-acid content associated with adaptation contributes to osmotic equilibrium with the new environment; it apparently regulates cell volume. The increase or decrease in the concentration of cell solute alters the freezing point of the tissues and thus superimposes a gain or loss in freezing tolerance on a simple colligative basis. [6 figures, 1 table, 30 references]

1.87 (1.0144)(9.15) THE CRAYFISH PARASITE THELOHANIA CONTEJEANI HENNEGUY (SPOROZOA, MICROSPORIDIA) FOUND IN FINLAND

Sumari, Olli, and Kai Westman (Bureau of Fisheries Investigation, Fabianinkatu 32, Helsinki 17, Finland)
Annales Zoologici Fennici 7, 193-194 (1969) (Helsinki, Finland)

The crayfish Astacus astacus L. and A. pallipes Lereb. are susceptible to infestation by the parasite T. contejeani. The fish ingest the parasitic spores, which develop, penetrate into the muscle tissue, reproduce, mature, and eventually burst. Often the infection causes the death of the host. At this point, the non-motile spores are released into the water and the infection cycle begins again.

The abdomen of crayfish that are heavily infected is bright white. To prevent the "white tail disease," the East German Schaeperclaus recommended, in 1954, that all diseased crayfish caught should be carefully destroyed, including those below minimum legal size. He recommends it as an effective method in instances where most crayfish caught have to be released because they are undersized.
[2 figures, 6 references] LB

2.1123

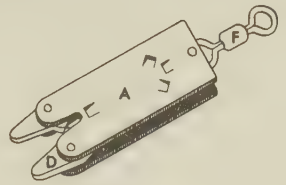


Fig. 2 - Autoclip

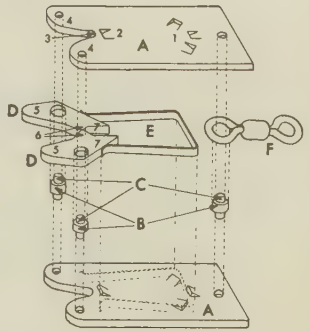


Fig. 3 - Auto-clip, exploded view

A. Body plates	1. Spring guide projections
B. Bushings	2. Jaw stop projection
C. Rivets	3. Slot or throat
D. Jaws	4. Ears
E. Spring	5. Jaw lips
F. Swivel	6. Jaw teeth
	7. Jaw points

2.11 DEVELOPMENT OF AN ADVANCED HIGH SEAS FISHERY AND PROCESSING SYSTEM

Klima, Edward F. (Exploratory Fishing and Gear Research Base, Bureau of Commercial Fisheries, Pascagoula, Mississippi 39567)
Marine Technology Society Journal 4, No. 5, 80-85 (September-October 1970)

The author discusses a new concept in harvesting of fish--an automated fishing platform. He suggests that submerged structures resembling small pup tents could concentrate up to 25 metric tons of fish per day. By using a peripheral ring of such structures, certain coastal pelagic fish could be led (by means of sequentially pulsed light) to a centrally located floating platform. The fish could be concentrated at the platform by an electric field then collected by means of a suction pump. The author suggests that bait fishes and jacks of the Gulf of Mexico and South Atlantic might be harvested by this sytem.
[9 figures, 14 references] FTP

2.1121 SEARCH FOR THE IDEAL TRAWL

Larsson, Karl-Hugo
World Fishing 19, No. 6, 58-59 (June 1970)

The author describes some of the work he has been doing over the past quarter century to reduce trawl-door resistance on single-boat pelagic trawls. One of his designs, made in 1946, did not get tested until 1966. It was an off-bottom trawl with a front curtain that was in constant contact with the bottom and thus acted like a tickler chain. This gear, which should enable rough ground to be fished with less risk, was adopted by the Russians, who showed a similar trawl at the Leningrad Fisheries Fair. Other of his ideas are described and the theory behind them mentioned. One of his hopes is that modern techniques for molding plastic will make possible the introduction, at an acceptable cost, of the trawling paravane, a door he developed as the "trawl toad" in 1949. [7 figures] LB

2.1128 A REMOVABLE DECK-BLOCK MOUNTING PAD
(2.1478)

Corbett, Michael G. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Gloucester, Massachusetts 01930)
Commercial Fisheries Review 32, Nos. 8-9, 54-55 (August-September 1970)

Equipping the BCF research vessel Delaware II with a stern fished hydraulic jet dredge for survey work on ocean quahogs required that a block be mounted at the stern in the middle of the trawl passage. The block provides a lead forward to the trawl winch for the quahog dredge haulback wire. The hydraulic dredge is hauled up the stern ramp. This block is required only for cruises on which the hydraulic jet dredge is used; it would be in the way of and obstruct trawling operations. Rather than weld a pad to the deck and burn it off each time, a quickly removable block mount to cover the space when the pad was not in use was designed and installed. The following diagrams show the details of the assembly.

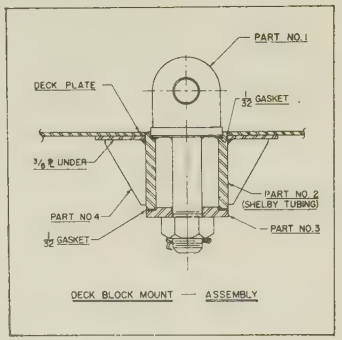


Fig. 1 - Drawing of assembly.

(over)

2.12 QUANTITATIVE SAMPLING WITH THREE BENTHIC DREDGES

Hudson, Patrick L. (Bureau of Sport Fisheries and Wildlife, North Central Reservoir Investigations, Yankton, South Dakota 57078)
Transactions of the American Fisheries Society 99, No. 3, 603-607 (July 1970)

The sampling characteristics of the 9-in. by 9-in. Ekman dredge, the Ponar dredge, and a No. 1 orange-peel dredge were tested. The sampling area was assumed to be about 520 $cm.^2$ Sampling area and volume of bottom material collected were measured in the laboratory; efficiency of the dredges for sampling different bottoms and organisms was evaluated in the field.

The Ekman dredge is useful with SCUBA because of its light weight. However, its use is restricted to soft, finely divided littoral bottoms free of vegetation and coarse debris. Unless an accompanying diver forces it into the bottom and forceably closes its jaws, it will not effectively sample the deeper burrowing organisms. Because it produced a shock wave and variable sampling results, the orange-peel dredge was judged of questionable value. Of the three, the Ponar was the most versatile; its usefulness is limited only in deposits of silt of over 12.7 cm. [2 figures, 1 table, 8 references]

2.114 SAVING THE WINCH BRAKES

Smithson, J. G.
World Fishing 19, No. 6, 61-62 (June 1970)

During shooting, the trawler steams ahead at about 9 knots with the winch paying out warp at about 6 knots. This substantial pull on the warps necessitates a continuous braking of the winch barrels, a braking that continues throughout the shooting operation. On modern stern trawlers, the lining of traditional hand-controlled brakes wears rapidly, partly due to the greater power and higher speeds of modern trawlers and partly due to the direct pull of the warp over the stern. Since this pull is from 6 to 8 tons, exerted at 5 or 6 knots, powers of the order of 200 or 300 hp. have to be absorbed from the warp. And the winch-brake linings have to convert this power into heat for 10 straight minutes every 2 hours. That brake-lining wear is excessive, then, is not surprising.

If the linings on mechanical brakes are to be relieved, some other form of rotary brake must be used. Both hydraulic and electrical brakes have been tried. The hydraulic system involves the use of an additional braking device as part of the winch drive; the electrical system involves use of the motor of electrically driven winches for braking. Since the winch motor generates electrical energy as it brakes the winch and since the power produced is recovered and used to help the main engines propel the ship, this practice is called regenerative braking.

The Ward Leonard system of trawl-winch control is described; under certain conditions, regenerative braking is inherent in this system. Also described is a

(over)

2.3 MISSISSIPPI TESTS USE OF CHEMICALS IN REMOVING SKIN
(3.23) FROM FRESH, FROZEN CATFISH

Anonymous
Feedstuffs 42, No. 34, 40 (August 22, 1970)

Present methods of skinning catfish (by hand, machine, hot water treatment, and abrasives) are not altogether satisfactory. To find a better method, researchers at Mississippi State University's Agricultural Experiment Station have tested a method in which sodium hydroxide (lye) is used. The results have been published in the July issue of Mississippi Farm Research. (The reporting article was authored by G. R. Ammerman, professor of food technology, and W. G. Lee, graduate assistant.) The researchers emphasize that the results are preliminary. Although the method effectively removes the skin without imparting off-flavors to the flesh, no data have been taken on long-term storage effects. For this reason, they advise processors to use the method with caution.

In the experiment, freshly killed catfish were dipped in boiling solutions of 0, 5, 7, 9, and 11% sodium hydroxide for 0.5, 1, 1.5, and 2 min. Visual and colorimeter values were taken on the degree of skin removal, and taste tests were run on the deep-fried product. Visual examination showed that most of the skin was removed during the longer exposure times in each lye concentration. Analysis of the treatment effect showed that both concentration of lye and time of exposure were highly significant. Visual ratings for percent pigment and percent skin removal agreed with the "b," "L," and "a" values determined with a Hunter color meter.

(over)

2.114

new automatic warp-tension control that regulates the speed of the winch, automatically adjusting it to match the reduced speed of the trawler. This control eliminates the need for careful speed matching and leaves only that act of judgment that must be made when electrical braking is superseded and the mechanical brakes are applied for the final stop. [6 figures]

LB

2.1128

Fig. 2 - Detail drawings.

2.114
(2.151)(.85)

METHOD OF PROCESSING SHRIMP AND RELATED SHELLFISH

U.S. Patent 3,525,128

Jones, John W., Jr. (General Tool Company, Inc., Mobile, Alabama) (pat.)

The apparatus described is designed to dress nongraded shellfish. Shrimp or other shellfish of any size are selectively positioned for deheading as they are conveyed through the system in independently movable troughs; they are then deheaded, deveined, shelled, and graded for storage. Positioning within the trough is effected by progressive application of transfer fluid pressure directed against the compression. The apparatus is preceded by a self-adjusting knife and shell-fish compression.

The apparatus is highly compact and quite mobile, thus it is particularly adaptable for use on board trawlers or other fishing vessels.

LB

Fig. 3 - Cover plate assembly.

2.3

Hunter "b" values are a measure of yellow and blue. Since catfish flesh is more yellow than blue, these values indicate the degree of removal of the dark skin. Most "b" values were significantly higher (indicating a change from blue toward yellow) at all concentrations for the 1- to 2-min. periods. Hunter "L" values indicate lightness and darkness. Concentration of the lye solutions affected these values significantly; however, time in solution had no significant effect, nor did the interaction between concentration and time of exposure. The "L" values indicated a significantly lighter color when the concentration of lye was increased from 0 to 5%, little significant change when it was increased from 5 to 7%, and a significantly darker color when it was increased to 8 or 11%. The researchers explain this apparent inconsistency by pointing out that only at the higher concentrations was all the skin removed. The 9 and 11% solutions removed from 99 to 100% of both skin and pigment; the 7% solution during a 2-min. exposure removed from 95 to 99%. The Hunter "a" values show changes in skin color. These values were least useful in evaluating the effectiveness of the skinning method--the "a" scale showed no significant difference in skin color as lye concentration was increased.

Of the 10 panelists who judged the deep-fried product for taste, 7 found the flavor equal to that of the control, 2 found it better, and 1 found it slightly inferior. The control was commercially frozen fish; the test portions were catfish skinned in the 11% lye solution.

The researchers conclude that the best overall treatment is 2 minutes' exposure in 9% lye solution followed by a dip rinse in water and a 3-min. dip in 2% acetic acid solution. This treatment removes 100% of both skin and pigments without causing any change in pH or flavor of the product. Tests on frozen catfish, though not fully replicated and controlled, gave similar results.

2.116
(2.146)

FISH FINDING WITH SONAR. PART SEVEN--ECHOES FROM FISH

Anonymous
World Fishing 19, No. 6, 74-75 (June 1970)

The intensity of the sonar echoes received from fish is governed by the size of the fish, the angle at which the fish are hit by the sound beam, whether or not the fish have swim bladders, whether the fish are clustered or dispersed, the time of year, and the nature of the fishing grounds. Figures illustrate the way to distinguish herring traces from those given by octopi, and how use of side-to-bow training sonar reduces the size of uncovered fish pockets during high-speed steaming.

The last part of the article summarizes the 14 major points made in the seven articles constituting this series. [15 figures]

LB

2.12 ANNOTATED BIBLIOGRAPHY OF ZOOPLANKTON SAMPLING DEVICES

Jossi, Jack W. (Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory, Miami, Florida 33149)
U.S. Fish and Wildlife Service, Special Scientific Report--Fisheries 609, iv + 90 pp. (July 1970)

The bibliography gives references to publications issued since 1873. It has information on many characteristics of these divices. The references are listed by author and by KWIC index. [1 reference]

Author's abstract

2.3 PEST CONTROL
(0.6)(0.8)

Food Manufacture 45, No. 6, 59 ff. (June 1970)

"Factory Pests," by Bull, J. O. (Rentokil Laboratories Ltd., Felcourt, East Grinstead, Sussex, England), pp. 59-62.
In this article the author describes the important pests in food plants, their methods of control, and the equipment used in their eradication. [3 illustrations]
"Preventive Pest Control," by Shenker, A. M. (London Pests Unit, Ministry of Agriculture, Fisheries and Food, London, England), pp. 67-69.
This article explains how to design buildings that are pest proof and how to make existing buildings better in pest proofness. [1 illustration]
"Pesticides" (for Insect Control in Food Premises), by Hill, Edward G. (Pest Infestation Control Laboratory, Ministry of Agriculture, Fisheries and Food, Liverpool, England), pp. 70-72.
The author discusses the use of pesticides and fumigants in food-manufacturing and storage premises. [1 illustration, 8 references]

3.13 GAS PACKAGING WITH CARBON DIOXIDE

Abbey, J. R. (Distillers Company (Carbon Dioxide) Limited)
Food Manufacture 45, No. 9, 37-40 (September 1970)

Packaging with carbon dioxide has many advantages. It is commercially available at low cost; in the context of food packaging, it is harmless to humans and to the food; its introduction into gas-impermeable packages containing food purges the air from the pack and ensures that the natural oils, fats, and vitamins present will not be degraded by atmosperic oxygen--thus no off-odors or -flavors can develop; since it inhibits the growth of many aerobic and some anaerobic organisms, it prolongs storage life; and, since it is soluble in natural fats and in moisture, it causes transparent plastic film that wraps foods to fit the food snugly, producing a neat, tidy pack whose color (and freshness in the mind of the consumer) improves sales appeal.
This article surveys the case histories of products (including fish) that are being packed under carbon dioxide atmospheres, the films that are most appropriate for such packaging, and the machinery and equipment that are available for production packaging. [6 photographs]

3.13 PRESERVING FOODS UNDER REDUCING GASES
Verbruggen, Maria L.
German Offen. 1,935,566 (part.)
Chemical Abstracts 72, No. 19, 99376y (May 11, 1970)

2.6 BETTER FINANCING, MARKETING NEEDED BY CATFISH INDUSTRY
(9.16)

Brown, Robert H.
Feedstuffs 42, No. 35, 8, 49 (August 29, 1970)

A Mississippi firm organized by 2,000 industrialists who had a large part in the development of the Southern poultry business is entering the catfish industry. The company, taking a cue from the poultry industry, is entering the catfish business on the basis of vertical integration--it owns a catfish hatchery capable of producing 25,000,000 fingerlings a year; it will soon have completed development of 1,688 acres of ponds (it already has 1,000 acres under water); through a county bond issue, the most up-to-date catfish-processing plant possible is being built; it will operate two types of restaurant specializing in catfish products, one selling a new take-out product called fish crispies and one being a family-style restaurant; and it plans to build a feed mill to produce feed for the fish being raised in the company ponds. Thus the vertical integration cycle from production through marketing of the finished product will be complete. The firm is concerned with two of the most critical, most unfamiliar areas of the business, financing and marketing (to overcome any possible sales resistance generated by the term "catfish," the firm referes to its product as "farm fish" only). It is also directing attention to harvesting techniques, feeding and nutritional requirements of the fish, and processing methods.

4.11 PRODUCTION OF AN ARTIFACT DURING METHANOLYSIS OF LIPIDS BY BORON TRIFLUORIDE-METHANOL

Fulk, Winifred Knuese, and Mary S. Shorb (Department of Poultry Science, University of Maryland, College Park, Md. 20742)
Journal of Lipid Research 11, No. 3, 276-277 (May 1970)

Previous work (Lough, 1964) demonstrated the production of an artifact (methoxy-substituted fatty acids) from unsaturated fatty acids methylated with a boron trifluoride-methanol reagent. The methoxy-substituted fatty acids, also, had a carbon number of 21.5. The present researchers found that the production of an artifact by methanolysis of total lipids of Ascaridia galli (a comparatively large intestinal nematode of the chicken) with boron trifluoride-methanol was dependent on the reaction time and age of the reagent used. They showed, too, that this artifact was produced from oleic acid. Methanolysis of total lipids with sodium methoxide was complete in 10 min. (as compared to 90 min. with boron trifluoride-methanol), and no artifact was produced.
The authors conclude that methanolysis with boron trifluoride-methanol may not always be reliable for analysis of total fatty acids and may alter the fatty acid pattern by as much as a 30% reduction of methyl oleate with an increased production of the artifact. [1 figure, 5 references]

2.41 THERMALLY INSULATED CONTAINERS

British Patent 1,172,102
A.I.R., 86 Dalhousie Street, Glasgow, C.3, Scotland (pat.)
Refrigeration and Air Conditioning 73, No. 868, 74 (July 1970)

The containers are light, of high strength, and drip and weather proof. They can be lifted with a crane and can be stacked in a hold. FTP

2.5 PRESERVING GOODS IN TRANSIT
(3.231)

British Patent 1,173,478
Union Carbide Corp., 270 Park Avenue, New York, N.Y. (pat.)
Refrigeration and Air Conditioning 73, No. 868, 74 (July 1970)

Insulated containers are kept below "refrigeration" temperature by spraying a low-boiling liquefied gas into the storage chamber. FTP

0.8 ICE-MAKING MACHINE
(2.3)

British Patent 1,168,855
420 North Second Street, Fort Smith, Arkansas (pat.)
Refrigeration and Air Conditioning 73, No. 868, 74 (July 1970)

The machine, specially designed for hotels, dairies, fish markets, and poultry processing plants, produces a continuous flow of ice pellets. FTP

4.14 TRIGLYCERIDE ANALYSIS: NEATSFOOT OIL AND SPERM WHALE OIL

Barr, I. G. (Highgate and Job Ltd., 35 Regent Road, Liverpool, England), and R. J. Hamilton, and K. Simpson (Department of Chemistry and Biology, Regional College of Technology, Byrom Street, Liverpool 3, England)
Chemistry and Industry No. 30, 988-989 (July 25, 1970)

This article presents data on the triglyceride analysis of neatsfoot oil and sperm whale oil. The results for neatsfoot and sperm whale oil (and oils for other mammals) suggest that saturated shorter chain acids are preferentially esterified in the 2-position. Therefore, the criteria for selective incorporation in the 2-position should include a chain length factor in addition to the unsaturation one. (The present theories of triglyceride composition have been developed from a consideration of oils rich in acids with 16 and 18 carbon atoms, and show that, particularly in vegetable fats, unsaturated acids tend to fill the 2-position.)

The triglyceride structures for neatsfoot oil and sperm whale oil show very small amounts of the trisaturated glycerides (SSS). (See following table.) Also, the sperm whale oil is unusual in that it has a larger portion of SSU than SUS.

Oil	Triglyceride composition 1/					
	SSS	SSU	SUS	USU	SUU	UUU
Neatsfoot	0.3	2.3	4.3	4.1	31.4	57.6
Sperm whale	2.0	12.1	4.1	18.5	25.0	38.2

1/ S = saturated. U = unsaturated.

[4 tables, 11 references] FTP

2.15 ANNUAL REPORT TO THE DANISH FISHING INDUSTRY
(2.01)(2.19)
(6.132)

Anonymous
Fiskeriministeriets Forsøgslaboratorium, 46 pp. (1970) (København, Denmark) (In Danish; English summary)

The main results of the experimental work being done on industrial fish are summarized in three sections:

Raw Materials for Fish Meal Manufacture (a description of the inadequacies of the refrigeration systems used on board Danish fishing vessels)

Changes in Atmosphere Surrounding Nongutted Fish in Bulk (reference to the concentrations of hydrogen sulfide that seeps from fish holds into crews' quarters and the danger of the poisonous and suffocating gases that pollute the air around harbors and fishmeal factories)

The Effect of Temperature on the Storage Life of Nongutted Fish (the research and development efforts being concentrated on reduction of the gases emitted by decomposing whole fish). [11 figures, 2 tables] LB

3.4 FLAVOR EFFECTS OF DIFFERENT WOODS ON WHITEFISH SMOKED IN A KILN WITH CONTROLLED TEMPERATURE, HUMIDITY, AND AIR VELOCITY

Lantz, A. W. (Fisheries Research Board of Canada Freshwater Institute, Winnipeg 19, Manitoba), and M. Vaisey (Faculty of Home Economics, University of Manitoba, Winnipeg 19)
Journal of the Fisheries Research Board of Canada 27, No. 7, 1201-1207 (July 1970)

This paper reports on the acceptability of canned smoked whitefish (Coregonus clupeaformis). The fish had been presmoked with 12 different woods. The purpose of the work was to provide information that would help processors to select wood smoke sources that would produce a fish product of maximum consumer acceptance. The woods used were: white ash, trembling aspen, beech, birch, hickory, hard maple, red maple, burr oak, red oak, white oak, balsam poplar, and diamond willow. All lots of fish were smoked for 95 min. at 32° C. and 55% relative humidity in revolving stainless-steel baskets mounted on a wheel frame in a stainless-steel kiln. The kiln was automatically and thoroughly washed between wood treatments. Sixty-one untrained judges examined the canned products, scoring their preferences on a 9-point hedonic scale. Five trained judges classified the flavors of the whitefish smoked with different woods.

The panel of untrained judges preferred the canned smoked whitefish that had been smoked with red maple, red oak, trembling aspen, white ash, balsam poplar, and birch. They liked moderately well the canned whitefish that had been smoked with beech and white oak, but indicated that the canned whitefish that had been presmoked with hard maple and hickory were only of borderline acceptability. The trained judges classified the distasteful flavors as medicinal, astringent, gasolinelike, and sour depending upon the wood source. The canned smoked products prepared from female whitefish were liked slightly better than those prepared from male whitefish. [1 illustration, 3 tables, 11 references] FTP

4.19 NEUTRAL ALKOXYLIPIDS AND WAX ESTERS OF MULLET (MUGIL CEPHALUS) ROE

Spener, Friedrich, and Donald M. Sand (University of Minnesota, The Hormel Institute, Austin 55912)
Comparative Biochemistry and Physiology 34, No. 3, 715-719 (June 1, 1970)

Analysis of the roe of mullet revealed that two classes of neutral alkoxylipids are present in amounts of less than 0.1%: alk-1-enyl diglycerides and alkyl diglycerides. C_{16} chains constitute from 60.6 to 74.7% of the alk-1-enyl and alkyl chains of glycerol-derived lipids and of the alkyl chains of wax esters. Both C_{16} and C_{18} ["C_{17}" in the authors' summary] are prominent in the fatty acids of wax esters, appearing at a level of 32.3 and 24.1%, respectively. All lipid classes contain from 8.8 to 15.0% of odd-numbered carbon chains. The amounts of polyunsaturated alk-1-enyl and alkyl glycerol ethers are small and of polyunsaturated odd-chain alcohols in wax esters, negligible; but the amount of polyunsaturated fatty acids in the wax ester fraction of mullet roe is high compared to the amount in other marine waxes. [1 table, 17 references]

6.195 SELENIUM CONTENT OF ATLANTIC, GULF MENHADEN FISH SOLUBLES

Soares, J. H., Jr., and David Miller
Feedstuffs 42, No. 37, 22 (September 12, 1970)

Several researchers over the past 12 or 15 years have shown that dietary selenium is essential to prevent encephalomalacia, exudative diathesis, and muscular dystrophy in poultry. However, as little as 0.05 p.p.m. selenium, as sodium selenite, will prevent these physiological abnormalities. In 1968, Thompson and Scott suggested that from 0.15 to 0.2 p.p.m. selenium is desirable in poultry diets. As yet, the FDA has not approved addition of chemical compounds containing selenium to livestock rations. Thus, natural feedstuffs are the only permissible source of this mineral. Fish meal is a particularly rich source of selenium, menhaden fish meal, for example, having a content averaging 2.22±0.72 p.p.m. (1.86 p.p.m. handbook value). Thus addition of from 3% to 5% menhaden fish meal to poultry diets would bring the selenium content up to adequate levels.

Extending the work done on menhaden fish meals by Kifer et al.,(1968, 1969), the authors analyzed fish solubles obtained from 20 Atlantic Coast and 18 Gulf Coast commercial menhaden plants. They found that the concentration of selenium in solubles from Atlantic menhaden (Brevoortia tyrannus) averaged 2.22 p.p.m. (2.00 p.p.m. handbook value); that from Gulf menhaden (B. patronus), 2.59 p.p.m. (2.42 p.p.m. handbook value). Since the concentrations of selenium in the corresponding fish meals from these two areas were not significantly different from each other, the authors conclude that the water-soluble parts of fish have higher concentrations of selenium than the water-insoluble solids have. They attribute

(over)

6.32 (7.43) METHOD OF DETERMINING THE PIGMENT CONTENT OF MARINE PHYTOPLANKTON WITHOUT EXTRACTION

Konovalov, B. V., and O. D. Bekasova (P. P. Shirshov Academy of Oceanology, and A. N. Bakh Institute of Biochemistry, U.S.S.R. Academy of Sciences)
Oceanology 9, No. 5, 717-725 (1969)

The content of photosynthetic pigments in marine phytoplankton is important as an indicator of the primary production of the seas and oceans. Therefore the authors propose a method for determining, without extraction, the content of chlorophyll a, b, and c in sea water. The concentration of the pigments is calculated from the absorption spectrum of the phytoplankton precipitate on an opaque membrane filter.

On the basis of results obtained by extraction of pigments with aqueous acetone, the proposed method is compared with the standard method. The design of a photometric attachment for the SF-10 spectrometer is described.
[4 figures, 20 references]

6.34 (6.37)(2.06) APPLICATION AND CONTROL OF THE ALGIN-CALCIUM REACTION

Andrew, T. R., and W. C. MacLeod (Kelco Co., Chicago, Illinois)
Food Product Development 4, No. 5, 99, 102, 104 (August-September 1970)

Commercial alginates are long, linear polymers with molecular weights ranging from about 30,000 to 200,000. When algin reacts with polyvalent metal ions (calcium being most commonly used in food applications), sufficient crosslinking between adjacent polymeric chains occurs to cause precipitation. An understanding of the way this crosslinking occurs and of the ways to control it provides a valuable tool for use in product development.

The author explains the mechanism of controlling the calcium-alginate reaction--for example by heat or by incorporating such sequestrants as sodium citrate or one of the polyphosphates in proportions sufficient to alter the pH--to produce the desired gelation or precipitation point. He cites not only the different types of foods that can be protected by a properly applied algin-calcium system but the processing advantages attendant upon control of reaction time. Throughout the article he illustrates the qualities that can be attained by use of an algin-calcium gel system as well as the new types of products that can be developed with these qualities in mind: films to prevent water loss and freezer burn in frozen fish; breaded, prefried, imitation shrimp; artificial caviar; a sandwich made with a slice of ham and a slice of beer.
[3 figures, 1 table]

6.32 PLANT CHEMISTRY

Goodwin, T. W. (reviewer)
Phytochemical Phylogeny (Academic Press, London and New York, xiii + 335 pp. [June 1970]. Price 110s, $5.50.)
J. B. Harborne (editor)
Nature 227, No. 5262, 1066 (September 5, 1970)

This volume contains the proceedings of the Phytochemical Society Symposium held in Bristol, England, in April 1969. Among the articles contained is one on aquatic angiosperms (by J. W. McClure) and one on the importance of studying proteins in relation to plant phylogeny (by R. L. Watts). LB

6.32 GELLING AGENTS : RESEMBLANCES : DIFFERENCES : MODE OF SETTING : CONTROLLING THE FORMATION

Cakebread, S. H.
Confectionary Production 36, No. 2, 86-87, 89-90 (1970)
Food Science and Technology Abstracts 2, No. 6, 886, 6T181 (June 1970)

The structure of amylose, pectinic acid, agar, alginic acid, and carrageenan is described. The basic unit and the type of linkage between each unit are illustrated. The mode of gelling and the methods of controlling gel formation in each agent are discussed. [11 references] Extracter: LB

6.34 VARIATIONS IN ALGINIC ACID CONTENT WITH GROWTH STAGES IN TWO SPECIES OF SARGASSUM

Chauhan, V. D. (Central Salt & Marine Chemicals Research Institute, Bhavnagar, India)
Botanica Marina 13, No. 1, 57-58 (June 1970)

Sargassum swartzii (Turner) and S. tenerrimum were collected off the coast of Gujarat and their alginic-acid content, as it varies from October through January, was determined for three seasons. In other months, the plants are small and their weight is insignificant. The findings are tabulated below.

Sargassum species	Month collected	Length (cm.)	Growth phase	Alginic-acid content (percent)
swartzii	October	10	vegetative	11.27-14.28
	November	75	peak vegetative	16.87-19.71
	December	80	reproductive	11.91-17.19
	January	45	fruited and decaying	10.92-13.10
tenerrimum	October	12	vegetative	6.29-8.20
	November	65	peak vegetative	10.39-11.02
	December	110	reproductive	8.17-10.27
	January	85	fruited and decaying	7.10-7.19

Although the alginic-acid content of the species studied here is much lower than that reported for the same species collected off the coast of South India (for example, South Indian tenerrimum reportedly has an alginic-acid content as high as 34.6%), the author suggests that the content of S. swartzii is sufficient to justify its collection for commercial utilization.
[3 tables, 7 references] LB

4.3 (4.81) THE RELATIONSHIP BETWEEN DILATOMETRIC CHARACTERISTICS OF THE FATTY BASE OF MARGARINES AND THOSE OF THEIR COMPONENTS

Sambuc, S., and M. Naudet
Rev. fr. Cps gras 17, No. 4, 221-233 (1970)
B.F.M.I.R.A. 23, No. 8, Abstract No. 1622, 399 (August 1970)

This is a full account of experimental work to show that for a specific temperature range, it is possible to predict the dilatometric characteristics of the fatty base of a margarine from the specific volumes of its constituents. The numerical constants for the equations used in the calculations may be obtained from the specific volume (or solid-fat index) of a single blend of all the constituents.
Reprinted

4.90 (1.84) FURTHER STUDIES ON SCALLOP STEROLS IN RELATION TO CHOLESTEROL IN THE CHICK

Idler, D. R., and G. A. MacKinnon (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia) and Allan C. Cox (Canada Department of Agriculture, Research Station, Kentville, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 7, 1329-1331 (July 1970)

Groups of chicks were fed a basal diet, basal diet plus 1% cholesterol, basal diet plus 1% scallop sterols, and basal diet plus 1% scallop sterols plus 1% cholesterol. The blood cholesterol level of the chicks fed the cholesterol-supplemented diet increased significantly. No significant change in plasma cholesterol level occurred when scallop sterols were added to the basal diet. The blood cholesterol level of chicks fed the cholesterol-supplemented diet decreased significantly ($P < 0.05$) when scallop sterols were added to the diet.
[2 tables, 5 references] FTP

6.132 LA MOLIENDA DE LA HARINA DE PESCADO [THE GRINDING OF FISH MEAL]

Tornes, Eilif, and Paul George
Informe Tecnico No. 9, 12 pp. (1970) (Fisheries Research and Development Project, Apartado 2578, Caracas, Venezuela) (In Spanish; English summary)

The paper explains how the grinding of fish meal should be designed to render a product free of coarse particles with a minimum of dust, describes the special problems involved due to the heterogeneous material and the presence of stones and pieces of iron, and refers to various considerations concerning the economy and reliability of the grinding section in a fish meal plant.

The procedure for the screening tests is described, giving actual results of the examination of 3 types of meals and photos of fractions.

The results and photos demonstrate that the only way to guarantee that there are no big particles, is to pass the meal through a screen. However, before screening it the meal should be preground, breaking the bones and coarse particles but without affecting the particles that are already sufficiently small. It has been found through other experiments that these problems are best solved by using a pneumatic transport system for the dried meal. This system screens out the pieces of heavy foreign matter, cools the meal, and brings about an almost perfect pregrinding before screening. The system is described and illustrated.
[2 figures, 1 table, 4 photographs] Authors' summary

6.195

the higher levels in the Gulf fish solubles to possible leaching from the relatively high selenium soils that drain into the Mississippi River. Regardless of which type of these two fish solubles is used in feeds, a level of from 2% to 2.5% will supply the requried 0.05 p.p.m. selenium.
[1 table, 8 references]

6.36 (9.19) RESPIRATORY RELATIONSHIP OF A SYMBIOTIC ALGAL-BACTERIAL CULTURE FOR WASTEWATER NUTRIENT REMOVAL

Humenik, F. J. (Department of Civil Engineering, Ohio State University, Columbus 43210), and G. P. Hanna, Jr. (Department of Civil Engineering, University of Nebraska, Lincoln 68508)
Biotechnology and Bioengineering 12, No. 4, 541-560 (July 1970)

The authors developed a continuous symbiotic alga-bacteria system for the biological treatment of waste water. The system consists essentially of a mixed Chlorella-activated sludge that removes the eutrophying nutrients under aerobic conditions without supplementary aeration. They fitted oxygen-decline data to a mathematical model, which they then used to predict respiratory rates of the algal-bacterial culture, photosynthetic oxygenation, and steady-state oxygen concentrations. During steady-state operation, stable relative biological populations and a dissolved oxygen concentration of ~2 mg./l. were maintained; the excess biomass was harvested daily.

Respiratory and physiological relations indicate that the carbon dioxide-oxygen balance is fundamental to the steady-state operation of the system. Conditions for growth are best when the bacterial and the algal cells are in close proximity--the algae may benefit from the incomplete metabolic byproducts or nutrients and growth factors released by the bacteria, and the bacteria may use the vitamins and growth factors that leach from the algal cells; neither seems to inhibit the other. Microscopic examination showed that the bacteria were attached to the algal cells and the algae were integrally enmeshed in the bacterial matrix. This algal-bacterial floc settles very rapidly, leaving a clear supernatant.
[8 figures, 3 tables, 17 references]

LB

6.82 (9.16) OYSTER SHELLS AND FOAM FORMATION USED TO IMPROVE QUALITY OF WATER RECIRCULATED IN A FISH HATCHERY INCUBATOR

Short, Zella, and Paul R. Olson (College of Fisheries, University of Washington, Seattle 98105)
Progressive Fish-Culturist 32, No. 3, 180-182 (July 1970)

The water in the incubator at the College of Fisheries, University of Washington (Ellis, 1964), was recirculated over oyster shells during the 1967-68 incubation period. The purpose was to improve the osmotic environment for the eggs and fry of salmon and trout. The shells were loosely arranged in nylon sacks and placed in troughs at the top and bottom of the incubator. The shells remained in the troughs throughout the experiment.

Our observations suggested...that the oyster shells were a source of calcium to the system and, in general, improved the osmotic environment for the eggs in the incubator. Correlated with these results is the fact that survival to feeding time was greater among the eggs and young fry for the 1967 and 1968 brood years than in the previous years when oyster shells were not used.

The results also show that the byproducts of the hatching process were absorbed in a surface film and largely eliminated with the foam that formed. Consequently, the accumulation of organic matter, including ammonium-nitrogen (Bolton and Klein, 1961; Lloyd and Orr, 1969), did not become a problem.
[1 figure, 2 tables, 4 references]

Reprinted in part

6.54 (0.4) FLUORIDE CONTENT OF FISH PROTEIN CONCENTRATE

Hadjimarkos, D. M. (Department of Preventive Dentistry, University of Oregon Dental School, Portland 97201)
American Journal of Clinical Nutrition 23, No. 6, 684-685 (June 1970)

The author points out that the consumption by infants of diets enriched with fish protein concentrate (FPC) may have both harmful and beneficial effects. The concentration of fluoride in FPC ranges from 150 to 272 p.p.m.; thus consumption of 10 g. FPC a day [see the study reported by Tavill and Gonik, Commercial Fisheries Abstracts 23, No. 4, 17] would provide an intake of between 1.5 and 2.7 mg. fluoride a day. Such levels, taken during the period of tooth development, will protect the teeth from dental caries, but it will also produce objectionable dental fluorosis (mottled enamel). The optimum level for protection against caries is about 0.5 mg. fluoride a day.

The use of FPC is expected to be particularly widespread in the developing countries. Since considerable amounts of fluoride are ingested in some of these countries as a result of consumption of the crude sea salt produced by solar evaporation of sea water, and since crude sea salt contains up to 40 p.p.m. fluoride, the author suggests that the dental problems associated with the consumption of FPC in these areas particularly should be studied.
[10 references]

LB

6.85 (0.34)(2.113) BARNACLE GLUE

Singer, James
Sea Frontiers 16, No. 2, 96-103 (March-April 1970)

Preliminary research has indicated that the cement by which barnacles attach themselves to underwater substrates can be readily adapted to a wide variety of practical uses. It will bond any combination of materials permanently; and it will resist heat, cold, shock and practically any solvent known to modern science.

At the University of Akron (Ohio), a barnacle-research team put barnacle cement through a series of tests. They found that a layer 0.0003 of an inch thick has a shear strength of over 7,000 lb./sq. in., twice the strength of the epoxy glues that hold space craft together. It may be even stronger than that, for in many of the tests the barnacle shell or the material to which the shell was glued crumbled before the glue let go. At 662° F., the cured cement softens slightly but will not melt. At -383° F., it will not crack or peel. It will not dissolve in most strong acids, strong alkalies, organic solvents, or water. Since salt water cures the cement (and the human body is about 70% salt water), it has attracted the particular interest of dentists and surgeons.

One reason this superglue has not already reached the market is the difficulty researchers have in raising barnacles in the laboratory. Another is the size of the animal with which they work. A zoologist at the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences, where barnacle cementation is being studied, points out that barnacles are about 0.01 in. in diameter

(over)

LB

6.54 (0.4) DIET SUPPLEMENTATION FOR ENTIRE COMMUNITIES. GROWTH AND MORTALITY OF INFANTS AND CHILDREN

Baertl, Juan M., Enrique Morales, and Gustavo Verastegui (British American Hospital, Apartado 2713, Lima, Peru), and George G. Graham (Johns Hopkins Medical Institutions)
American Journal of Clinical Nutrition 23, No. 6, 707-715 (June 1970)

Two groups of people from communities having high rates of infant and preschool mortality and characterized by poor growth were given additional food equivalent to 250 kcal/person/day for over 5 years. One group received 7.5 g./day of wheat protein; the other received 12.5 g./day of equal amounts of wheat and fish proteins. The caloric value of the foods was the same.

After more than 5 years, the infant and preschool mortality for both populations had declined by more than 60%. All members of the test groups showed an increase in mean height and weight. Those eating the wheat-fish protein foods showed no clear advantage for having had nearly twice the protein that the other group had. [4 figures, 1 table, 11 references] LB

6.54 EDIBLE FISH PROTEIN CONCENTRATE

Kyndt, Gaston, Jean Muquardt (Sanders, Louis, South Africa) (pat.)
German Offen. 1,930,613
Chemical Abstracts 72, No. 23, 120270w (June 8, 1970)

6.85

at the beginning of the final larval stage, at which stage they first attach; their antennae are less than one-tenth that size. Thus, to get just a few drops of glue, the researcher needs almost a limitless supply of animals. Scientists at Duke University Marine Laboratory have recently discovered a way to raise quantities of barnacles in captivity. As a result, several laboratories throughout the country are working on various phases of the barnacle's life--from the final larval stage to the adult stage, when the shell enlarges and the newly formed outer edge attaches.

Histochemists at the William F. Clapp Laboratories, Battelle Memorial Institute, have concluded that the antennae contain neither the ducts for transporting the cement nor the glands for making it. They believe that nerve cells in the antennae produce it--bacteria on the substrate give off certain wastes or byproducts that send a "message" to barnacle larvae in the area, much as smells from a bakery send a "message" to human passersby. (They hypothesize that something in such metals as copper and zinc either prohibits bacterial growth or scrambles the message so the barnacles don't recognize it.) By increasing the intensity of the message, they may be able to increase the amount of glue secreted. By decreasing the intensity, they may be able to develop more efficient antifouling devices.

Meanwhile, the University of Akron team has discovered the source of glue in adult barnacles. Between the body sac and the barnacle's shell, and covering most of the inner base of the shell, is a yellow, gelatinous mass containing a series of paired glands. One gland contains a milky white fluid believed to be the shell builder. The other contains a pale brown, thick (about the consistency of motor oil) fluid that the members of the team feel sure is cement--when put in water, it hardened in 10 to 15 min. Now that the cement has been isolated and the work of analyzing the substances has begun, a way of synthesizing the compound should be found in the not too distant future. [6 figures]

7.0 (0.7)(2.9) NUTRITIVE ANALYSIS OF FROZEN FULLY COOKED INSTITUTIONAL FOODS

Harjes, C. F., and R. J. Smith (Product Methodology Department, Moffett Technical Center, CPC International Inc., Argo, Illinois 60501)
Food Technology 24, No. 9, 49, 50, 52, 64 (September 1970)

Complete composition data on precooked frozen foods are not available. Such information is essential for menu planners, particularly in institutions such as hospitals, to select the proper foods for the patients' therapeutic needs. The problem involves not only the collection of the required data but first of all the development of methods of analysis.

This paper reports on the methods and the equipment for the analysis of precooked frozen foods. The authors describe sample preparation and methods of analyses for protein, crude fat, ash, crude fiber, sodium and potassium, calcium, iron, and phosphorus. Nutritive analysis data are given for the cooked edible protion of roast chicken portion and pan-broiled beef liver portion. [2 illustrations, 2 tables] FTP

6.34 (6.36) FOAM

Anonymous
International Brewers' Journal 106, No. 1253, 73-75 (1970)
Food Science and Technology Abstracts 2, No. 6, 796, 6H738 (June 1970)

Foam can be made to adhere to glass by use of a polysaccharide produced by Xanthomonas campestris or by zinc and gum arabic or by propylene glycol alginate. Extracter: LB

6.69 (0.4) EFFECT OF HOLOTHURIN ON TRYPANOSOMA LEWISI INFECTIONS IN RATS

Styles, Twitty J. (Department of Biological Sciences, Union College, Schenectady, New York 12308)
Journal of Protozoology 17, No. 2, 196-198 (May 1970)

Holothurin, the active principle, or principles, in the Bahamian sea cucumber (Actinopyga agassiz) has been shown to inhibit growth of Ochromonas malhamensis, Euglena gracilis, and Tetrahymena pyriformis; to have biotoxic effects on Amoeba proteus and Paramecium caudatum; to cause irritability or death in crustaceans, mollusks, annelids, coelenterates, and a number of echinoderms; to cause developmental modification in sea urchins; to effect regeneration and survival of planarians; to influence haemopoiesis in the bone marrow of winterized frogs; and to inhibit tumors in mice. This study was undertaken to determine if this marine biotoxin could alter the host-parasite relation in rats with trypanosome infection.

Crude holothurin, injected intraperitoneally into rats that had been inoculated with trypanosomes, altered the host-parasite relation. Rats given holothurin before and at the same time as they developed trypanosome infection had lower parasitemias than the controls had. However, rats treated after parasitemia had developed had a higher level of infection. Both dosage and timing seemed to be important in the final effect.

On the basis of these results, the author suggests that holothurin or some of its derivatives may have pharmacological properties. Follow-up studies on the properties of this marine toxin, he adds, may contribute to the development of prophylactic and therapeutic agents effective in treating trypanosome infections in man and domestic animals. [2 figures, 15 references] LB

7.43 (9.16)(9.17) DETERMINATION OF INERT GASES IN WATER

Post, George (Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, Colorado 80521)
Progressive Fish-Culturist 32, No. 3, 170-173 (July 1970)

Water flowing from springs and artesian wells, or pumped from wells, is frequently supersaturated with dissolved gases. Very often the combination of gases is similar in composition to atmospheric air. This is probably because atmospheric air is drawn into aquifers with precipitation water seeping into soil and between rock structures. When this water is released through a fissure in rock aquifers as spring water, or is brought through these aquifiers with well casings, the sudden release of pressure on the water allows the release of excess gases.

Such gases are a potential hazard to fish and other aquatic organisms. These gases are a particular hazard to fish in fish-cultural stations because the fish are usually in the water soon after it comes from the ground. If these dissolved gases are made up of such elements as nitrogen, zenon, krypton, argon, and neon, they will be biologically inert and have a tendency to be released into body cavities of fish....Oxygen released into body cavities is absorbed by the body fluids, but the inert gases tend to accumulate into large bubbles. If they occur behind the eyeballs, these bubbles can be responsible for "gas popeye" and can lead to blindness.

The fish culturist who has a water source supersaturated with inert gases may try many types of degassing devices to release these gases from the water before

(over)

Reprinted in part

7.43 (9.19) AUTOMATED METHOD FOR DETERMINING AND REMOVING SILICA INTERFERENCE IN DETERMINATION OF SOLUBLE PHOSPHORUS IN LAKE AND STREAM WATERS

Campbell, F. Ross, and R. Leslie Thomas (Department of Soil Science, University of Guelph, Guelph, Ontario, Canada)
Environmental Science & Technology 4, No. 7, 602-604 (July 1970)

Phosphorus is perhaps the principle nutrient involved in the eutrophication process. The values for soluble phosphorus, the most frequently determined parameter in water analysis, are sometimes higher than those for total phosphorus when phosphorus is determined in the µg./liter range. These false values are due to interference from dissolved silica, which gives an apparent phosphorus reaction with ammonium molybdate. Sugawara and Kanamori (1961) showed that silica interference could be removed by an extraction into organic solvents at acidity levels that would prevent the formation and extraction of the silico-molybdate complex. The present authors, however, were unable to automate the procedure successfully. Therefore they devised a method whereby the amount of silica in the solution could be determined and used as a correction factor for the soluble phosphorus values obtained simultaneously. The method is described.
[2 figures, 1 table, 9 references]

LB

7.43 (9.19) A NEW APPROACH TO CONTROLLING BIOLOGICAL PROCESSES

Hiser, Leland L. (Southwest Research Institute, San Antonio, Texas)
Environmental Science & Technology 4, No. 8, 648-651 (August 1970)

The test for biochemical oxygen demand (BOD) has many limitations. It takes 5 days to be run, and it does not permit materials or energy balances. It describes both the food and the energy requirements, as well as the culture content, of biological systems. Separate parameters to describe the food, energy, and culture variables would lead to a simpler and better understanding of the biological systems involved in pollution control work and, thus, to more efficient monitoring of river systems and to improved design, operation, and control of treatment plants.

The author proposes that carbon parameters be used to describe the food and culture content of microbiological systems and that the change in total oxygen demand be used to describe the energy requirements. Use of such parameters will assist in the breakdown of the biological treatment process into a series of describable unit operations that are amenable to material balances and more precisely descriptive of unit rates. It will provide a common language for describing all biological systems--aerobic, anaerobic, or photosynthetic. It will permit analyses to be made directly on the system being studied without the need of setting up a secondary rate-limited system such as the BOD bottle. It will reduce analytical time from days to minutes. And it will make possible both materials and energy balances. [3 figures, 1 table, 4 references]

LB

7.50 (6.190) EFFECT OF STORAGE ON FISH MEAL QUALITY AS EVALUATED BY CHEMICAL INDICES AND CHICK BIOASSAY

Miller, David, Robert R. Kifer, and Mary E. Ambrose (National Center for Fish Protein Concentrate, Bureau of Commercial Fisheries, College Park, Maryland 20740)
Poultry Science 49, No. 4, 1005-1010 (July 1970)

Several chemical tests for quality of the protein of fish meals have been proposed, but so far none correlate satisfactorily with the chick-growth bioassay. Chemical tests have the advantage of rapid analysis; biological tests are long and impractical. The present study, therefore, was carried out to determine (1) whether any correlation exists between any of the presently available quick chemical tests and the chick bioassay of the quality of the protein of fish meal, and (2) whether any correlation would be similarly applicable to the quality of fish-meal protein after the meal had been stored for 2 years (at -20° C.).

Twelve meals were examined. The chemical tests consisted of proximate composition, pepsin digestibility, and available lysine.

For the bioassay, each diet was formulated to contain 12% protein from the fish meal and to contain 1.39% calcium and 0.75% phosphorus. Also, the diets were made isocaloric at 1377 metabolizable energy Calories per pound of feed. A reference diet using soybean meal and fortified with DL-methionine was used. Day-old male chicks were used and were fed the experimental diets for 3 weeks.

Initially, all 12 fish meals were of very good quality and showed relative growth ranging from 70% to 92% of the reference control diet. Each of the 12 meals,

(over)

FTP

7.43 (9.19) STUDIES ON THE KINETICS AND MECHANISM OF BOD EXERTION IN DILUTE SYSTEMS

Jennelle, E. M. (Department of Civil Engineering, Virginia Polytechnic Institute, Blacksburg 24061), and A. F. Gaudy, Jr. (Bioengineering Laboratories, Oklahoma State University, Stillwater 74074)
Biotechnology and Bioengineering 12, No. 4, 519-539 (July 1970)

The utility of the BOD test as a means of assessing the pollutional strength of a waste, as well as its applicability for predicting the kinetic course of deoxygenation in receiving streams, is debatable. The authors undertook the investigation reported here to determine the kinetic and mechanistic similarities and dissimilarities between closed (BOD bottle) and open (naturally aerated) systems. In addition, they hoped to devise improved techniques for predicting deoxygenation in the receiving stream. In their experiments, they compared the oxygen uptake in an open channel or simulated stream, in an open stirred reactor, in closed bottles incubated quiescently, and in closed bottles where the reaction fluid was continuously stirred during incubation. Using a variety of parameters, they also assessed the concentration of the limiting nutrient (usually the carbon source) and the density of the bacterial and protozoan population.

The rate constants of oxygen uptake increased as the concentration of the carbon source increased. Thus the usual dilution technique for predicting the rate of deoxygenation in receiving streams could not be used directly. The relation between the specific oxygen uptake rate and the concentration of the substrate approximated a hyperbolic function similar to the Monod relation for specific growth rate and substrate concentration.

The authors recommend use of an open stirred reactor technique rather than the standard BOD bottle dilution technique for predicting the rate of deoxygenation in receiving streams. [8 figures, 18 references] LB

7.43

it flows around the fish. Usually agitation of the water is necessary. Devices that are used for oxygenating water (aeration) may be used to degas water.

The fish culturist needs a means of evaluating the success of methods being used to degas water. Water can be flowed around fish, and observations made to determine the gas saturation in the water by effect on the fish. Mass spectrometry of the water can be used, but mass spectrometers are expensive and not directly available to the fish culturist.

Several years ago I devised a method that has been used with success on many types of spring and well water. This method is simple; the apparatus needed is inexpensive. The procedure yields results that are quantitative within the sensitivity required by a fish culturist. [The method and equipment are described.] [1 figure, 2 tables, 2 references]

7.43 (0.5)(9.11) RESPONSE OF NATURAL MICROBIAL POPULATIONS IN SEAWATER TO ORGANIC ENRICHMENT

Vaccaro, Ralph F. (Woods Hole Oceanogr. Inst., Woods Hole, Massachusetts)
Chemical Abstracts 73, No. 5, 22410f (August 3, 1970)

7.50

however, deteriorated to a different degree during the 2 years of storage at -20° C. At the end of the 2 years, the growth response obtained in the bioassay was 30% less than that obtained initially.

Chemical tests showed no consistent loss in available lysine, or in proximate composition except there was a decrease in extractable lipid during storage. Pepsin digestibility values decreased slightly, whereas growth response decreased considerably. These chemical indices of the quality of the protein of fish meal did not correlate statistically with the chick bioassay results.

The authors note that no benefits are derived by storing fish meal at -20° C., because the losses in growth response of meals stored frozen were almost as great as those for meals stored at room temperature.
[6 tables, 8 references]

7.463 (9.19) FLUORIDE IN FOOD

Oelschlaeger, Walter (Inst. Anim. Nutr., Stuttgart Univ., Hohenheim, Germany)
Chemical Abstracts 73, No. 1, 2828g (July 6, 1970)

7.49 NONDESTRUCTIVE DETERMINATION OF PROTEIN, TOTAL AMINO ACIDS, AND AMMONIA IN MARINE SEDIMENTS

Greenfield, Leonard J. (University of Miami, Rosenstiel School of Marine and Atmospheric Sciences), Robert D. Hamilton (Univ. of California, San Diego), and Catherine Weiner (Univ. of Miami)
Bulletin of Marine Science 20, No. 2, 289-304 (June 1970)

By the method described here, the amounts of amino acids and ammonia in sediments are measured colorimetrically with hydrindantin-ninhydrin reagent. The substances are measured together to give a total value; the ammonia, after diffusion into boric acid, is treated with the reagent; and the value for ammonia is subtracted from the total value to give the amount of amino acid. Protein content is determined by a protein-solubility technique coupled with a micro-biuret method. The protein was dissolved in NaOH and reacted with biuret reagent to give a product detectable under ultraviolet light.

All these determinations can be made with minimum effort on small samples of sediment. All except that in which ultraviolet spectrometry is used can be carried out in the field. Each has a point at which the products will remain stable for several days even though the procedure is stopped. Sensitivities are from 0.020 to 0.150 μM NH_3-N or amino-N/ml. and from 0.02 to 0.2 mg. protein/ml. of final solution. [6 figures, 3 tables, 6 references] LB

7.51 (6.190) FACTORS AFFECTING PROTEIN EVALUATION OF FISH MEAL BY CHICK BIOASSAY

Miller, David, and Robert R. Kifer (National Center for Fish Protein Concentrate, Bureau of Commercial Fisheries, College Park, Maryland 20740)
Poultry Science 49, No. 4, 999-1004 (July 1970)

The quality of a protein resides in the biological availability of the content and the pattern of its amino acids. The evaluation of protein quality involves feeding to animals of the test material as the sole source of protein. Growth response of the animal, then, is used as a measure of the quality of the protein. The present paper reports on the effects of certain dietary factors involved in the methodology of evaluating protein quality by the chick bioassay. Specifically, the authors conducted four experiments to determine: (1) the effect on the growth response of chicks of the dietary caloric content of three fish meals of apparent different quality; (2) the response from various nitrogeneous supplements equivalent to 3% protein; and (3) the effect of addition of crystalline amino acids.

Thirty-three different dietary treatments using five different fish meals were studied. In one experiment, three different caloric levels (1252, 1377, and 1502 metabolizable energy [M.E.] per pound of feed) were studied for each of three fish meals. For the tests of nitrogenous supplements, herring meal, casein, or gelatin was added at 3% protein level to three different 12% protein diets (total protein content 15%). Day-old broiler cockerels were used and were grouped in in temperature-controlled battery pens of 12 chicks each. The feeding test ran for 21 days. (over)

7.51 (7.1) PARAMAGNETIC LABELING STUDIES. 1. A NEW METHOD FOR LABELING PROTEINS WITH A STABLE PARAMAGNETIC NITROXIDE RADICAL

Wagner, Thomas E., and Chen-Jung Hsu (Division of Endocrinology, Sloan-Kettering Institute for Cancer Research, New York City, N.Y. 10021)
Analytical Biochemistry 36, No. 1, 1-5 (July 1970)

The use of paramagnetic labeling in the study of protein conformations and the interaction of proteins with other species is a most powerful tool. However, preparation of the paramagnetic species presently used for these studies is elaborate and difficult, and problems are encountered in attaching the label to proteins due to the limited solubility of most of the paramagnetic labels that have been used. In the present paper, the authors report on a fast, efficient method for the attachment of an extremely water-soluble paramagnetic nitroxide label to the free amino groups of proteins. In this study the paramagnetic species 2,2,6,6-tetramethyl-4-piperidone-1-oxyl was reacted with poly-L-lysine and the EPR (electron paramagnetic resonance) spectral characteristics of the reaction product were studied. The paramagnetic label was prepared by the catalytic oxidation of 2,2,6,6-tetramethyl-4-piperidone with hydrogen peroxide (Lebedev and Kazarnovskii, 1959). Based on the results of these studies, the authors suggest that the reductive alkylation of protein amino groups with 2,2,6,6-tetramethyl-4-piperidone-1-oxyl could provide a uniquely simple method for the rapid labeling of proteins with paramagnetic labels. [3 figures, 13 references]

7.85 (6.132)(0.5) SALMONELLAE IN FISH MEAL PLANTS: RELATIVE AMOUNTS OF CONTAMINATION AT VARIOUS STAGES OF PROCESSING AND A METHOD OF CONTROL

Morris, George K., William T. Martin, William H. Shelton, Joy G. Wells, and Philip S. Brachman (Epidemiology Program, National Communicable Disease Center, Atlanta, Georgia 30333)
Applied Microbiology 19, No. 3, 401-408 (March 1970)

The purpose of this study was to determine the sources of salmonellae in fish meal and the factors that affect the persistence and survival of salmonellae during the processing of fish meal. Three meal plants were examined during the period from 1962 to 1964. Then, a sanitary control program was introduced in the three plants, and a followup study was carried out in 1968. A fourth plant was examined in 1968 only. This paper reports on these examinations and also suggests a method of reducing contamination of fish meal to nondetectable levels of salmonellae.

Samples for examination were taken from the dockside water at each plant, from the plant's raw-fish area and processing area, and from the warehouse area. Also samples of fish were taken immediately after they were landed in the Gulf of Mexico, and were taken from the boats when they arrived at the plant.

The fish examined immediately after they were caught in the Gulf of Mexico showed no salmonellae, but those fish taken from the boats when they arrived dockside at the plant frequently showed salmonellae. Salmonellae were frequently isolated from the dockside water at each of the four plants. About one-half of the (over)

7.86 (0.4) A SURVEY ON THE OCCURRENCE OF VIBRIO PARAHAEMOLYTICUS ON FISH AND SHELLFISH, MARKETED IN THE NETHERLANDS

Kampelmacher, E. H., D. A. A. Mossel, L. M. van Noorle Jansen, and H. Vincentie (National Institute of Public Health, Utrecht, and Central Institute for Nutrition and Food Research T.N.O., Zeist, The Netherlands)
Journal of Hygiene 68, No. 2, 189-196 (June 1970)

Since Vibrio parahaemolyticus is nonpsychrotrophic and mesophilic, the authors assumed that relatively low numbers of the organism would occur on fresh, chilled fish and shellfish. Therefore, they needed a suitable enrichment technique, followed by subculturing for isolation on an appropriate solid medium. This report describes the development of the method of detection and summarizes the results of its use on fish and shellfish bought in three Utrecht fish shops.

The best method of detection was judged to be: (1) enrichment of swabs taken from the surface and the gills in freshly prepared meat broth with 5% NaCl; (2) streaking onto bromothymol blue teepol sucrose salt agar (pH 7.8) and taurocholate citrate bromothymol blue sucrose salt iron agar (pH 9.2); (3) confirmation of suspect colonies by testing for mode of growth using a freshly steamed deep tube of 5% NaCl starch agar, a Kligler-type glucose sucrose iron thiosulfate agar in butt/slant form, and a tube of 2% NaCl 2% trypticase water for testing indole formation and the oxidase reaction according to Kovacs (1956).

The low degree of contamination found (only one specimen of 407, a haddock, contained the vibrio) leads the authors to conclude that V. parahaemolyticus probably is unimportant as a cause of gastroenteritis in the Netherlands. [2 tables, 20 references]

7.591 PREPARATION OF STABLE p-CHLOROMERCURIBENZOATE SOLUTIONS
(0.38)
Muftic, M. (Department of Biochemistry, Trinity College, Dublin, Ireland)
Analytical Biochemistry 36, No. 2, 539-540 (August 1970)

Organic mercurial compounds are among the more specific and sensitive reagents for reaction with sulfhydryl groups and have been widely used to study enzymes containing sulfhydryl groups. Solubilized p-chloromercuribenzoate reagent is precipitated by buffers at pH 7 and is relatively unstable on standing. The author, using triethylamine and sodium pyrophosphate, succeeded in solubilizing p-chloromercuribenzoate and in obtaining solutions of 0.01 M that are clear and stable over the pH range 4 to 9 for a considerable time at room temperature. [3 references] FTP

7.59 DREGS FROM THE SEA: HETEROTARGETING
(0.4)(6.69)
Corriman, Ivor (U.S.A.)
Chemical Abstracts 72, No. 13, 64954h (March 30, 1970)

7.89 MOISTURE AND pH CHANGES AS CRITERIA OF FRESHNESS IN ABALONE
(3.337)(1.83) AND THEIR RELATIONSHIP TO TEXTURE OF THE CANNED PRODUCT

James, D. G., and June Olley (CSIRO, Division of Food Preservation, Hobart, Tasmania)
Food Technology in Australia 22, No. 7, 350-351, 353, 356-357 (July 1970)

When abalone (Haliotis ruber leach) are removed from their natural environment or when they are kept in tanks through which insufficient sea water circulates, their pH falls, they lose an appreciable amount of tissue fluid, and anaerobic glycolysis begins. Between 0.5° and 18° C., acid production on the surface of the foot increases with temperature; liquor loss is at a minimum when the temperature reaches about 7.5° C. Shucked abalone exhibit similar changes.

The changes in pH and tissue fluid in the fresh abalone have marked effects on the water content of the canned abalone foot and on the liquor losses or drained weight losses in the can, the water content of the canned foot being directly related to the pH of the foot. The mean texture of the canned abalone, as determined by an untrained taste panel, correlated significantly with the hydrogen ion concentration.

The authors point out that the texture changes within the pH range occurring during normal processing conditions are very real and of considerable commercial importance. This work, they believe, shows the principles required for obtaining a desired texture. [7 figures, 2 tables, 8 references] LB

7.51

The chicks responded to both the quality and the quantity of protein. Maximal growth response of the chicks was achieved at 1377 M.E. per pound of feed for the 15% levels of a superior (good quality) protein. A 1252 M.E. per pound of feed was adequate for the growth of chicks fed an inferior protein at the 15% dietary protein level.

A deteriorated aged fish meal was slightly improved when 0.36% of arginine was used, but was made worse when 0.14% of methionine was used.

Excessive addition (2.59%) of glycine to the feed produced a substantial depression in the growth of the chicks. [5 tables, 8 references]

7.85

samples from the raw fish processing areas were contaminated with salmonellae. The proportionate number of samples positive for salmonellae decreased as the samples were taken progressively through the processing sequence. Nevertheless, 15% of the samples of the finished product (meal) showed salmonellae.

The salmonellae apparently survived and multiplied in the processing area of the plant when the plant was idle. As a result the first portion (the first 30 to 45 min.) of each day's production would show contamination. This portion apparently contaminated the rest of the meal in the warehouse when the products were blended to prevent overheating. Reprocessing the first 45 min. of each day's production reduced the numbers of salmonellae in the product to nondectable levels

The author recommends the following practices to improve sanitation in fishmeal plants: (1) use chlorinated water in the fish pumping process, (2) do not reuse pumping water, (3) clean boats and plant machinery after each use, (4) reprocess the first portion of each day's fishmeal production, and (5) use decontaminated railroad cars and trucks to ship the meal.
[1 figure, 8 tables, 10 references]

7.89 EVALUATION OF SAFETY FOR FOOD ADDITIVES: AN ILLUSTRATION INVOLVING THE INFLUENCE OF METHYL SALICYLATE ON RAT REPRODUCTION

Gross, M. Adrian, O. Garth Fitzhugh (Bureau of Science, Food and Drug Admin., Consumer Protection and Environmental Health Science, 200 C Street, SW, Washington, D.C. 20240), and Nathan Mantel (Biometry Branch, National Cancer Institute, National Institutes of Health)
Biometrics 26, No. 2, 181-194 (June 1970)

Safety concepts developed by Mantel and Bryan (1961) have been modified so that they apply to the toxic effects of food additives. The modification covers the case in which the dose-response curve yields data improperly suggestive of the agent's nontoxic threshold. It provides for estimation of a safe level of the agent, at least in the food given the test animal. This level may be safe if a threshold exists and if the level is no more than minimally toxic when no threshold exists or when the threshold is lower than the safe level estimated.

Calculation of a safe dietary level of methyl salicylate is also described. [4 figures, 1 table, 3 references]

8.51 (2.8) [COMPARATIVE CHEMICAL STUDY OF THE PROTEINS OF RAW AND FRIED MEAT FROM THE POINT OF VIEW OF DIETETICS]

Dworschak, E. (Orszagos Elelmezes-es Taplalkozastudomanyi Intezet, Budapest, Hungary)
Elemiszervizsgalati Közlemenyek 15, No. 5, 263-272 (1969)
Food Science and Technology Abstracts 2, No. 6, 878, 6S494 (June 1970)

After hydrolyzing the meats with 20% HCl according to the method of Lindner et al. (1957), the author determined amino-acid composition of raw, fried, or roasted pork, beef, sausage, fresh-water fish, and poultry. Cooking caused no significant changes in the foods. Some of the results for fried or roasted meat are shown in the table.

The content of available and of total sulfhydryl groups was determined by the method of Alexander et al. (1960). Total sulfhydryl groups decreased in the fried meats. [30 references]

Amino acid	Mean amino-acid content in cooked meat (% of raw meat content)
Arginine	95.9
Glutamine	101.2
Isoleucine + leucine	102.8
Lysine	97.0
Threonine	91.3
Valine	98.3

8.51 (1.93) LEPTOSPIRAL AGGLUTINATING FACTOR IN TURTLES. FURTHER STUDIES ON FRACTIONATED SERA

Shenberg, Esther, A. Friedlander, M. Torten, and S. Ben-Efraim (Israel Institute for Biological Research and WHO/FAO Leptospirosis Reference Laboratory, Ness-Ziona, Israel)
Israel Journal of Medical Sciences 6, No. 3, 408-412 (May-June 1970)

Van der Hoeden et al. (1961, 1968) have shown that the serum of some turtle species contains a factor that strongly agglutinates certain parasitic and saprophytic strains of leptospira. This factor, which is not detectable in the sera of young turtles weighing less than 13 g., may have a globulin nature. The aim of the work reported here was to characterize this factor and to determine to what extent its absence in the sera of young turtles is related to the turtles' globulin pattern.

Using Clemmys caspica caught in fish ponds around the country, the authors separated a fraction of serum containing the leptospiral agglutinating factor from the whole serum. During immunoelectrophoretic tests, this fraction behaved like γ-globulin, exhibited a low sedimentation coefficient, and was sensitive to mercaptoethanol treatment. The sera of young turtles that did not agglutinate leptospira strains were also lacking in significant amounts of protein with γ-globulin electrophoretic mobility. [3 figures, 2 tables, 15 references]

8.59 (1.37) A COMPARATIVE PHYSICO-CHEMICAL CHARACTERIZATION OF LACTATE DEHYDROGENASE: ISOZYMES IN BROOK TROUT, LAKE TROUT AND THEIR HYBRID SPLAKE TROUT

Wuntch, Thomas, and Erwin Goldberg (Department of Biological Sciences, Northwestern University, Evanston, Illinois 60201) [Requests for reprints should be addressed to Goldberg]
Journal of Experimental Zoology 174, No. 3, 233-252 (July 1970)

The authors used substrate kinetics, heat inactivation parameters, peptide mapping, and amino-acid analysis to compare the various LDH (lactate dehydrogenase [L-lactate: NAD oxidoreductase, E.C.1.1.1.27])isozymes, or multiple molecular forms, in brook trout (Salvelinus fontinalis), lake trout (S. namaycush), and their F_1 hybrid, the splake trout.

Peptide maps and amino-acid composition of LDH crystallized from skeletal muscle extracts of the trouts were similar. The molecular weights were identical to those of mammalian LDH. The five A'-A isozymes (those in skeletal muscle) migrated very slowly toward the anode; they were restricted to muscle. The B'-B isozymes (those in tissues) were ubiquitous in the trouts' tissues, although cell-specific proportions occurred. Although the A'-A subunit genes must be present in all the cells, they were active only in the muscle, where their products were responsible for nearly all the LDH activity there.

B subunit-containing tetramers (which are less anodal) predominated in LDH from the liver; B subunit molecules (which are more anodal) predominated in LDH

(over)

8.51 (1.69) MODIFICATION OF A METHOD AND RESULTS OF QUANTITATIVE DETERMINATION OF DNA IN CERTAIN ORGANS OF THE JAPAN SEA FLOUNDER [PSEUDOPLEURONECTES YOKOHAMAE GÜNTHER]

Pirskiy, L. I., and G. D. Berdyshev (Institute of Biologically Active Materials, Far Eastern Branch, Siberian Division, U.S.S.R. Academy of Sciences, Vladivostok)
Problems of Ichthyology 9, No. 4, 585-588 (1969)

The method of Orlov and Orlova (1961) for the quantitative determination of DNA was modified by substituting a double-wave spectrophotometric method (based on the computational formula of Tsanev and Markov (1960)) for the isolation of DNA from the organs on the basis of phosphorus and carbohydrate components. Use of this formula permits more accurate accounting for the influence of protein admixtures specific for each tissue. Comparison of test data determined for the DNA content in the liver of rats and mice with comparable literature data indicated the modified method would give satisfactory results.

The authors used the method to determine the quantity of DNA in the organs of Japan Sea flounder. They found that the liver, intestines, and muscle contained 27.4±2.2, 32.3±1.2, and 4.0±1.1 mg.% of phosphorus, respectively. The concentration of DNA in the different organs fluctuated appreciably with season, sex, and age--that in the liver and muscle of females being greater than in males, that in muscle decreasing with age (however, that in the liver remained relatively unchanged), and that in milt at ripeness stage IV being 1.2 times greater than at ripeness stage III and 1.6 times greater than at ripeness stage II.
[1 figure, 2 tables, 19 references] LB

8.42 (0.4) BARIUM IN SEA WATER

Walgemuth, K., and W. S. Broecker (Lamont-Doherty Geological Observatory, Columbia University, Palisades, New York 10964)
Earth and Planetary Science Letters 8, No. 5, 372-378 (June 1970)

Interest in the distribution of barium in sea water has been prompted by its chemical similarity to Ra-226, a radioisotope having potential application to studies on circulation rates. But no stable isotope of radium exists. Because the distribution of Ra-226 in the sea is influenced by particulate cycles, normalization to some stable form is prerequisite to its use as a radiotracer. Thus barium becomes a logical choice. The success of barium as the normalization partner depends on the validity of the assumption that the radium-barium ratio in all particulate phases in the sea is the same as it is in surface sea water. Using the stable isotope dilution method described by Chow and Goldberg (1960), the authors determined the vertical profiles of the barium content of the Atlantic and the Pacific.

In the Atlantic, the barium content ranged from 8 µg./l. at the surface to 14 µg./l. in deep water; in the Pacific it ranged from 8 µg./l. to 31 µg./l. These findings confirm the hypothesis that barium is incorporated in the remains of surface organisms and is released into the deep sea as the organic debris sinks to the bottom. The higher barium content of Pacific deeps coincides with that of such other biologically active elements as carbon, nitrogen, phosphorus, and silicon. The similarity of the profiles for barium and radium supports the expected chemical coherence of the two. [6 figures, 3 tables, 14 references] LB

8.59

from the heart. B′ subunit tetramers were very sensitive to increases in pyruvate and lactate; they attained maximum initial velocity at about 0.8 µmole of pyruvate; substrate inhibition began at 7 µmoles. The B tetramers reached initial maximum velocity at 1.3 µmoles of pyruvate; the A′-A tetramers at 3.5 µmoles. Substrate inhibition began at about 20 µmoles. When lactate was used as substrate, results were similar to those obtained with pyruvate; however, only the B′ tetramers showed substrate inhibition.

Novoa et al. (1959) showed that oxamate inhibits LDH by competing with pyruvate in combining with the enzyme-$NADH_2$ complex to form an inactive ternary complex. The present authors' calculations revealed that one molecule of inhibitor (or substrate) is bound per active site (or sites) on trout LDH.

The inactivating temperature for the B′ subunit tetramers (from heart tissues) was between 70° and 75° C.; for B subunit tetramers (from liver), between 65° and 70° C.; and for A′-A tetramers, between 46° and 54° C. Although the generally lower thermal stability associated with LDH-5 from most animals was exhibited by both the A′-A and the B subunit-containing tetramers, the A′-A tetramers were particularly thermolabile, The loss of LDH activity, as shown by the kinetics of the heat inactivation process, was attributed to a first-order, unimolecular event consistent with protein denaturation.
[8 figures, 5 tables, 62 references]

8.59 (1.88) PARAMYOSIN-STRUKTUR UND SPERRTONUS, UNTERSUCHUNGEN AM BYSSUSRETRAKTOR VON MYTILUS EDULIS MIT DEM INTERFERENZ-KONTRAST-MIKROSKOP [ANALYSIS OF THE PARAMYOSIN STRUCTURAL CHARACTERISTICS OF THE SMOOTH MUSCLE OF MYTILUS EDULIS WITH THE INTERFERENCE-CONTRAST MICROSCOPE]

Schumacher, T. (Institut für Zellphysiologie der Ruhr-Universität Bochum, D-463 Bochum-Querenburg, Deutschland)
Experientia 26, No. 6, 631-633 (June 15, 1970) (In German)

Surviving muscle fibers of the smooth muscle of Mytilus edulis in "catch," or the fused state, exhibit a characteristic pattern of longitudinal stripes when examined by the Nomarski (1955) technique--that is, by differential interference contrast. The pattern seems to be caused by aggregated paramyosin filaments. It disappears when the catch is abolished with 5-hydroxytryptamine or, in freeze-dried preparations, when the pH of the ATP-salt solution is raised.
[3 figures, 19 references] LB

8.59 (1.125) MULTIPLE FORMS OF 6-PHOSPHOGLUCONATE DEHYDROGENASE AND ALPHA-GLYCEROPHOSPHATE DEHYDROGENASE IN THE SKIPJACK TUNA, KATSUWONUS PELAMIS

McCabe, Mead M., David M. Dean, and Craig S. Olson (Laboratory for Quantitative Biology, Department of Biology, University of Miami, Coral Gables, Florida 33124)
Comparative Biochemistry and Physiology 34, No. 3, 755-757 (June 1, 1970)

During previous studies of tuna populations in the tropical Atlantic, the senior author observed electrophoretic variations in tissue esterases, acid phosphatase, alkaline phosphatase, and several dehydrogenases. In the present study, he and his coworkers noted that electrophoretic variations of 6-phosphogluconate dehydrogenase seemed to originate in allelic differences at a single locus. The electrophoretic patterns of alpha-glycerophosphate dehydrogenase were apparently influenced both by allelic differences at a single locus and by the consistent occurrence of artifact bands. They conclude, therefore, that the two enzymes may not be genetically polymorphic. [2 figures, 1 table, 4 references]

LB

9.11 (1.013) THE SALINITY STRUCTURE OF THE GULF OF CARIACO, VENEZUELA

Griffiths, Raymond C., and John G. Simpson (FAO)
Resources and Fishery Exploitation Series 1, No. 7, 275-301 (1967) (In Spanish and English)

This report is part of an environmental inventory of the area in which most of the sardine fishery in eastern Venezuela is conducted. The importance of this inventory is shown by the fact that there are seasonal and annual fluctuations in the availability of the sardine stocks which do not appear to be related to the fishing effort.

The salinity of the Caribbean Sea is determined by two types of water according to Parr (1937). The salinity maximum at about 200 m. exceeding a value of 36.5 ‰) originates in the Sargasso Sea. The lower surface salinities originate from equatorial Atlantic water and, near the Venezuelan coast, with the contribution of freshwater from the major rivers of northern South America, particularly the Orinoco; this contribution is seasonal. The deeper low-salinity water around the minimum at about 800 m. is of Antarctic Intermediate water.

In the Gulf of Cariaco, where ocean water enters sporadically, it must be reasonably assumed that local evaporation and rainfall have appreciable effects, and that interchange with the open ocean is chiefly dependent on the trade winds which blow mainly from the northeast in the dry season (November-May) and more variably though frequently from the northwest in the rainy season (May-November). [10 figures, 5 tables, 3 references]

Authors' introduction

9.11 THE TRADE WIND ZONE OCEANOGRAPHY PILOT STUDY
PART IX: THE SEA-LEVEL WIND FIELD AND WIND STRESS VALUES JULY 1963 TO JUNE 1965

Seckel, Gunter R. (Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii 96812)
U.S. Fish and Wildlife Service, Special Scientific Report--Fisheries 620, iii + 66 pp. (June 1970)

This report contains monthly summaries of sea-level wind observations and the derived wind stresses at the sea surface in the area bounded by lat. 0° and 35° N. and long. 130° and 170° W., July 1963 to June 1965. The wind data and wind stress values, in addition to other meteorological properties and heat exchange processes that were published previously (Seckel, 1970), complement the TWZO (Trade Wind Zone Oceanography) Pilot Study oceanographic data (Charnell, Au, and Seckel, 1967a, 1967b, 1967c, 1967d, 1967e, 1967f).

The TWZO Pilot Study was designed to further an understanding of the mechanisms that change the distribution of sea-water properties and water masses in the North Pacific trade wind zone (Seckel, 1968). The meteorological processes are an essential part of these mechanisms; e.g., the heat exchange processes affect the heat budget and the wind stress affects the momentum budget of the ocean.

...[The] need for monthly measures of the wind stress will continue and increase as oceanographers begin to forecast changes in the distribution of ocean properties and meteorologists develop circulation models to begin a global weather forecasting. The experiences gained in the calculation of large-scale sea-air

(over)

Reprinted in part

9.12 (2.12) SOME ASPECTS OF THE ORGANIZATION OF FISH SCHOOLS

Van Olst, Jon C., and John R. Hunter (Bureau of Commercial Fisheries Fishery-Oceanography Center, P.O. Box 109, La Jolla, California 92037)
Journal of the Fisheries Research Board of Canada 27, No. 7, 1225-1238 (July 1970)

The organization of fish schools is characterized in that the individuals stay together, tend to head in the same direction, and maintain even spacing, and also the activities of the individuals tend to be synchronized. The cohesive and synchrony of movement of a school develop gradually during early growth of the fish and vary among schooling species at maturity. In the present study, the researchers compared and described these aspects of school organization for certain pelagic marine fishes at different stages of development by analysis of spatial and angular relations. The schooling pelagic marine fish studied were Pacific mackerel, jack mackerel, northern anchovy, jacksmelt, and topsmelt. The organization of the schools was studied in larval through adult stages by analysis of spatial and angular relations among the fish in dorsal photographs of the schools.

Schools of young fish, larval and juveniles (in all species studied), were less compact and showed greater differences in angular headings than did the schools of adult fish. The rate at which the structure of the schools changed with size varied among the species of fish. Also, school organization differed among the species at the adult stage--schools of Pacific mackeral were most compact and organized, and jacksmelt and topsmelt were the least organized.

(over)

FTP

9.11 STEROLS IN RECENT MARINE SEDIMENTS

Attaway, David, and P. L. Parker (University of Texas, Marine Science Institute, Port Aransas 78373)
Science 169, No. 3946, 674-676 (August 14, 1970)

Sterolic fractions were isolated from marine sediments from Baffin Bay, Texas, and San Pedro Basin, California. Four major components of the sterol fractions were cholesterol, campesterol, stigmasterol, and β-sitosterol. Survival of these common plant and animal sterols for several thousand years suggests that these molecules may be useful geochemical indicators. [3 figures, 11 references] FTP

9.12

The analysis of spatial and angular measurements (four species studied) revealed that the neighbor directly ahead of a given fish in a school is used more frequently as an angular reference for the "following reaction" than ones to the side. Furthermore, the fish were closer to adjacent neighbors in the file than they were to ones in rank. Apparently spacing in the horizontal plane may be related to tail movement.
[4 figures, 3 tables, 16 references]

9.12 STUDIES ON THE OSMOREGULATION OF THE CHUM SALMON, ONCORHYNCHUS KETA (WALBAUM). II. HISTOLOGICAL OBSERVATIONS OF THE BRANCHIAL EPITHELIUM ACCORDING TO THE GROWTH OF THE FISH FROM HATCHING
(1.35)

Kashiwagi, Masaaki, and Ryuhei Sato (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 20, No. 4, 212-221 (December 1969)

The researchers examined histologically the branchial epithelium of chum salmon alevins and fry in relation to their development of tolerance to sea water as the fish became older. They concluded from these tests, that the chloride secretory cell of the gill of the chum salmon develops gradually as the fish grows older in fresh water, and prepares for the function of hyperosmoregulation at seaward migration. They believe this conclusion is supported by the fact that the number of the large, granular and acidophilic cells of the alevins increases as they grow older, and tends to be stable at about 40 days after hatching.
[11 figures, 14 references] F.T.P

9.11 THE DENSITY DISTRIBUTION IN THE GULF OF CARIACO, EASTERN VENEZUELA
(1.013)

Simpson, John G. , and Raymond C. Griffiths (FAO)
Resources and Fishery Exploitation Series 1, No. 8, 303-327 (1967) (In Spanish and English)

The Gulf of Cariaco is the focus of Venezuela's largest fishery, that for the sardine, and is known to have a high rate of primary production (Curl, 1960; Simpson, 1963). This is considered to be brought about chiefly by the wind-induced upwelling which would inevitably lead to marked distortion of the density field and this in turn would produce local water movements causing mixing.

Although the density of seawater is more dependent on temperature than on salinity and although the salinity range in the area of the Gulf of Cariaco is comparatively small, the results discussed in this paper (supported by previous studies on salinity and temperature) show that, at times, salinity played an important part in determining the density distribution in this Gulf.
[5 figures, 4 tables, 5 references]

Reprinted in part

9.11

interactions from marine surface meteorological observations may therefore be of help in future work. The manner in which the distribution and quality of marine meteorological data can be improved and processing can be facilitated has already been suggested by Seckel (1970). Additional suggestions concerning wind observations...[are given here].
[5 figures, 17 references, 1 appendix]

9.11 NUMERICAL CALCULATION OF UPWELLING IN A NON-HOMOGENEOUS OCEAN

Zhukov, L. A. (Leningrad Institute of Hydrometeorology)
Izv., Atmospheric and Oceanic Physics 6, No. 1, 41-45 (January 1970)

The author proposes a numerical system for calculating stationary upwelling at various levels in a nonhomogeneous ocean. His calculation of vertical velocity is based on a three-dimensional model of stationary circulation in a baroclinic ocean. The form in which the boundary conditions are given affect the basic equations for the model very little. Thus calculations for a limited sea area are possible, even when a land mass constitutes part of the boundaries.

Results obtained by use of the method off the northwest coast of Africa are given. [3 figures, 8 references] LB

8.8 NOTES ON FISH AND SHELLFISH
(9.19)

Hardy, E.
Cann. Pckg. 40, No. 470, 8 (1970)
B.F.M.I.R.A. 23, No. 7, Abstract No. 1406, 345 (July 1970)

Some of the causes of discoloration in canned and frozen fish are briefly discussed. Levels of the pesticides DDT, DDE and DDD in fish, shellfish and plankton from different places in the United States are examined. Reprinted

9.13 (4.12) DYNAMICS OF POLYUNSATURATED FATTY ACIDS IN CERTAIN SPECIES OF FISHES OF THE BLACK SEA. COMMUNICATION I. THE SEA SCORPION [SCORPAENA PORCUS L.]

Yakovleva, K. K. (Institute of Biology of the Southern Seas, Academy of Sciences of the Ukrainian SSR (INBYuM), Sevastopol, U.S.S.R.)

Problems of Ichthyology 9, No. 4, 597-602 (1969)

The sea scorpion is classed as a lean fish. Because the principle fat reserves are contained in the liver, the author studied the dynamics of the fatty acid content of the liver throughout the year but that of the muscles only in January and April.

The fatty acid composition and the iodine number of the sea scorpion's liver fat varies with the physiological condition of the fish. The iodine numbers of the fat can be used as an indicator of physiological condition. The fatty acid composition of both liver and muscle fat is monotypic. Hexaenoic acid is most abundant in both fats, followed by pentaenoic acid; linolenic acid is scarcest; linoleic acid and arachidonic acid is intermediately abundant. The linolenic and pentaenoic acids are reliable sex indices--the fat of females containing a higher percentage of the former and the fat of males containing a higher percentage of the latter. The relation between iodine numbers and the total of the five polyunsaturated fatty acids found is direct, as is the relation between iodine numbers and hexaenoic acid in liver fat and between iodine numbers and pentaenoic acid in muscle fat. The content of polyunsaturated fatty acids is higher in the muscles than in the liver. [7 figures, 4 tables, 8 references]

9.13 (4.9) THE METABOLISM OF WAX ESTERS AND OTHER LIPIDS BY THE MARINE COPEPOD, CALANUS HELGOLANDICUS

Lee, Richard F., Judd C. Nevenzel, G.-A. Paffenhöfer, and A. A. Benson (Scripps Institution of Oceanography, University of California, P.O. Box 109, La Jolla, California 92037)

Journal of Lipid Research 11, No. 3, 237-240 (May 1970)

In previous work, the authors (Lee, Nevenzel, and Paffenhöffer, 1970) demonstrated the presence of polyunsaturated wax esters in Calanus helgolandicus. Furthermore, they demonstrated that the composition of the wax esters varied with the nutritional state of the animals, indicating that the wax esters were undergoing metabolic changes. In order to determine the nature of these changes, the authors fed ^{14}C-labeled diatoms (Skeletonema costatum) to adult female Calanus and recorded the changes that occurred in the lipids during subsequent starvation or feeding with nonlabeled diatoms. During starvation of the copepods, both the wax esters and the triglycerides were largely depleted within 72 hours; the cholesterol and phospholipid decreased at much slower rates. Apparently, the polyunsaturated wax esters of Calanus can be effectively and quickly used to serve the energy requirements of the organism. [3 tables, 16 references]

9.13 (9.19) DISTRIBUTION OF INGESTED ZINC-65 IN THE TISSUES OF SOME MARINE CRUSTACEANS

Fowler, Scott W., Lawrence F. Small (Department of Oceanography, Oregon State University, Corvallis 97331), and John M. Dean (Department of Biology, Battelle Memorial Institute Pacific Northwest Laboratory, Richland, Washington)

Journal of the Fisheries Research Board of Canada 27, No. 6, 1051-1058 (June 1970)

Autoradiographs of tissues of euphausiids and shrimps were prepared in an attempt to determine the specific location of ^{65}Zn in the euphausiids after they had ingested radioactive brine shrimp nauplii, and in prawns (Pasiphaea pacifica Rathbun) and shrimps (Pandalus stenolepis Rathbun and P. platyceros Brandt) after they had fed on the euphausiids. The isotope was located primarily in the interstitial spaces between muscle fibers, in the eye mainly between the rhabdoms and crystalline cones of adjacent ommatidia, within the exoskeleton, and on the exterior surface of the exoskeleton. Apparently, ^{65}Zn (and therefore zinc) is highly labile in marine crustaceans and will accumulate in certain specific locations regardless of the mode of uptake. Most of the ^{65}Zn was located intercellularly, not intracellularly; therefore, most ingested zinc accumulates in excess of the animals' needs and is not used metabolically. [2 figures, 3 tables, 25 references]

9.14 (1.37) COMPARATIVE DRY DIET FEEDING EXPERIMENT ON RAINBOW TROUT (SALMO GAIRDNERI RICHARDSON) IN FLOATING NET-CONTAINERS

Westman, Kai, and Olli Sumari (Board of Agriculture, Bureau of Fisheries Investigation, Helsinki) and Jorma J. Laine (Institute of Meat Technology, University of Helsinki)

Soumen Kalatalous 40 Finlands Fiskerier, 46 pp. (1969) (Helsinki, Finland)

Pelleted dry fish diets are easier and more economical to prepare, store, transport, and use than wet diets. They are efficient producers of fish flesh and are available all year round. Their use brings loss through leaching to a minimum, permits automated feeding, and makes quality control more effective. Nevertheless, prolonged feeding of dry diets can have undesirable effects on the fish, producing slight deficiency symptoms, weakness in the development of eggs, anemia, and fatty liver. The value of fish as food is based primarily on the high biological value of its protein. But, since the chemical composition as well as the amount of edible flesh can be affected by what the fish eats, fish foods should be judged not only in the terms generally used (gains in weight, mortality, health, condition factor, and the conversion of food into edible fish) but also in terms of the composition of the fish flesh produced. Thus fattening fish by over-feeding or by feeding a diet excessively high in calories would not produce the best fish flesh.

The authors compared the value of six Finnish and four foreign (a Danish, a Swedish, and two English) commercial dry diets by feeding them to rainbow trout held in net enclosures in a dystrophic pond in Southern Finland. In preparation

(over)

9.13 (1.51)(4.13) SOME CHARACTERISTICS OF FAT METABOLISM OF THE WHITE SEA COD [ELEGINUS NAVAGA PALLAS]

Markevich, N. B., and M. I. Shatunovskiy (Department of Soil Biology, Moscow State University)
Problems of Ichthyology 9, No. 4, 589-596 (1969)

As the White Sea cod develops, the relative and the absolute concentration of its lipids changes, as does the ratio of the lipid fractions and of the individual fractions in the liver and the body. The fat content of the liver increases and that of the body decreases with age. The absolute fat content in the liver of 1-year-olds is 1.5 times higher than that in the body; in 3-year-olds, it is 5 times higher. In the body, phospholipids predominate; in the liver, triglycerides; in the blood, phospholipids and sterol esters; and in the gonads at the beginning of vitellogenesis, phospholipids. During development, the ratio of the individual lipids changes--in the liver, phospholipid and cholesterol content decreases but sterol ester content increases; in the body, phospholipid content increases; in the blood serum, the concentrations of phospholipids, cholesterol, and sterol esters decrease but those of unesterified fatty acids and triglycerides increase.

Within the limits of individual year classes, the following relation was found between the cod's growth rate and the quantitative and qualitative composition of the lipids in its liver and body: the higher the growth rate, the higher the relative lipid content of the liver (due to the larger quantity of unesterified fatty acids, triglycerides, and sterol esters) and the lower the lipid content of the body. [3 figures, 8 tables, 23 references] LB

9.14

for the feeding trials, they analyzed the physical and chemical characteristics of the water and determined the composition of the diets and the ingredients of the diets. Results of these analyses are tabulated. The fish were fed twice a day during the summer months, being sampled at intervals for growth (weight and length) and efficiency of food conversion. At the end of the experiment, condition factors were calculated from Fulton's equation, the intensity of flesh coloration was determined, and the chemical composition of the flesh and the liver was analyzed. On the basis of the conversion ratios, the cost of producing 1 kilo of fish was calculated for each diet. The findings regarding each diet individually and in comparison with the other diets are discussed.
[3 figures, 19 tables, 96 references]

9.14 NUTRITION OF SALMONOID FISHES: ARGININE AND HISTIDINE REQUIREMENTS OF CHINOOK AND COHO SALMON

Klein, Richard G., and John E. Halver (Western Fish Nutrition Laboratory, Bureau of Sport Fisheries and Wildlife, Cook, Washington 98605)
Journal of Nutrition 100, No. 9, 1105-1109 (September 1970)

Growth studies were conducted with Chinook (Oncorhynchus tshawytscha) and coho (O. kisutch) salmon fingerlings to determine the minimal requirements for arginine and histidine. A 40% protein diet containing an essential amino acid pattern similar to that found in whole egg protein was used as the experimental diet. The coho salmon required about 2.3% arginine and 0.7% histidine. The Chinook salmon required 2.4% arginine in the diet and the histidine requirement was placed at about 0.7% of the ration.
[3 figures, 7 tables, 15 references] Authors' abstract

9.13 (0.36)(1.84) THE EFFECTS OF METHIONINE AND CHOLINE CHLORIDE ON THE DIGESTIVE GLAND OF THE JAPANESE SCALLOP, PATINOPECTEN YESSOENSIS (JAY)

Suzuki, Sanya, and Yoshio Sugawara (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 20, No. 4, 204-211 (December 1969)

The authors studied the effects of methionine and choline chloride on the digestive gland of the Japanese scallop kept at a temperature of 24±0.5° C. for 200 hours. The authors suggested that the physiological condition of the fat cells, basophil cells, and secretory cells was affected by these compounds, and that recovery of the function of the basophil and secretory cells has a part in the elimination of lipid in the digestive gland. [7 references] FTP

9.13 (1.37) ACID AND ALKALINE PHOSPHATASE ACTIVITY IN THE LIVER OF BROWN AND RAINBOW TROUT

Mawdesley-Thomas, Lionel E., and David H. Barry (Department of Pathology, Huntingdon Research Centre, Huntingdon, England)
Nature 227, No. 5259, 738-739 (August 15, 1970)

Because rainbow trout and brown trout, though closely related, respond differently to administration of aflatoxin, their basic metabolism is probably different. Histochemical investigations of enzyme systems of their livers revealed that, although the livers are similar, the activity and distribution of the acid and alkaline phosphatases are distinctly different--alkaline phosphatase is more active in brown trout, whereas acid phosphatase is more active in rainbow trout.
[4 figures, 8 references] LB

9.15 (9.6) FISH DISEASES

Chubb, James C. (reviewer)
Principal Diseases of Marine Fish and Shellfish, x + 369 pp. (April 1970) 163s. (Academic Press: London and New York)
Carl J. Sindermann
Nature 227, No. 5259, 752 (August 15, 1970)

This summary of existing knowledge about diseases in marine animals expands reviews made by the author in 1966 and 1967. Chapter 1 contains nine hypotheses about the role of diseases in the marine environment. Chapter 2 describes the diseases of marine fishes, with special emphasis on those of commercially valuable food fishes. It contains drawings or photographs illustrating representative disease symptoms or organisms; 27 pages of references end the chapter. Chapter 3 has two sections, one on mollusks and one on crustaceans. It contains 21 pages of references for mollusks and 11 for crustaceans. The remaining six chapters deal with the importance of disease to the marine environment. Four of the topics considered are: mortalities of marine animals, with emphasis on the role of disease in North American clupeoid fishes and shellfish; disease and parasite problems in marine aquaria and cultivated populations; the relation of human diseases to those of fish; and the role of disease in the marine environment.
[2 references]
LB

9.14 A SLIDE-RULE FEEDING GUIDE

Piper, Robert G. (Bureau of Sport Fisheries and Wildlife, Fish Cultural Development Center, Bozeman, Montana 59715)
Progressive Fish-Culturist 32, No. 3, 168-169 (July 1970)

Several methods of calculating the amount to feed trout have been developed over the years.

Haskell (1959)...presented an equation for estimating the amount to feed trout in hatcheries, using hatchery records in which the feed conversion was known and growth was defined as a daily increase in body lengths.

Buterbaugh and Willoughby (1967) consolidated the constant factors in Haskell's equation which could result in a single "hatchery constant" and presented the following formulas:

(1) Hatchery constant = 300 × conversion × ΔL.

(2) Percent of body weight to feed daily = $\frac{\text{hatchery constant}}{\text{length of fish (inches)}}$

They presented a series of tables showing the percent of body weight to feed at various constants and fish sizes. When length of fish and percent of body weight to be fed are plotted on logarithmic graph paper, a straight-line relationship can be shown. As a slide rule is based on logarithms, we can use this logarithmic relationship to feed fish, using the D scale to represent the fish length and the CI scale for percent of body weight to feed....

(over)

Reprinted in part

9.16 MUSSELS, SCALLOPS, QUEENS & PRAWNS
(1.80)

Bowbeer, Arthur
World Fishing 19, No. 6, 66-67 (June 1970)

This article concludes the report on the conference organized by the Shellfish Association of Great Britain to encourage contact between scientists and producers. (See Commercial Fisheries Abstracts, p. 17, November 1970.)

"Morecambe Bay as a Source of Mussels for Large Scale Cultivation," by P. J. Dare, senior scientific officer at Conway, North Wales. This paper was of especial interest because of the intensity of the tides and the stony bottom in Morecambe Bay. The potential effectiveness of a proposed barrage some 4 or 5 miles up the Bay was discussed, as was Dr. Dare's work on the monitoring of spat abundance, the sampling of mussel beds as a check on settlement, and the effectiveness of various types of artificial collectors. One of these, a form of rubber-stabilized hair made into panels 6 in. square and about 1.5 in. thick, had an optimum collection rate of about 90,000 spat a month. In winter, the rate is only about 5,000.

"Scottish Mollusc Research," by James Mason, principal scientific officer, Department of Agriculture and Fisheries, Scotland. Dr. Mason has worked with both scallops and mussels. So far, little has been accomplished toward the culture of queens and scallops. However, the following facts are known: their natural habitat is at depths of from 10 to 20 fathoms; sometimes it can be as deep as 40 or 50 fathoms; they like bottoms that they can dig into, whether it be sand, mud, or shell; like other bivalves', their spatfall is irregular; their main predator is

(over)

LB

9.16 FISH FARM ENCLOSURES. 7--THE USE OF STANDARD FRAME UNITS

Milne, P. H.
World Fishing 19, No. 6, 46-47 (June 1970)

Enclosures for fish farms located in sea arms should consist of a fish net to confine the fish being reared and a predator net to protect the fish net. Hanging the predator net alongside the fish net calls for some sort of rigid frame. The author investigated existing net structures (stake and poke nets used for catching salmon) but concluded that, although they are quite suitable for intertidal enclosures where they can be maintained easily, they are not adaptable to enclosures that are premanently immersed in the sea. Then he looked into the A-frame used by the Royal Navy for shallow-water, antitorpedo, boom defense; the H-frame scaffolding used by cleaning and construction crews for working on buildings; and a specially designed K-frame.

As used by the Navy, the A-frames are assembled on shore, lowered into place by a derrick on board a barge, and held in position by a footchain and 1-ton sinkers. The author intended to hang both nets from the jackstay at the top of the frame, the predator net on the offshore leg and the fish net on the inshore leg. Thus either net could be reached from a wire-rope bridge attached at the apex of the A-frame. However, his trials showed that this type of enclosure is practical only if the bottom is firm enough to support the footchains and sinkers and if the water is sufficiently navigable to permit use of a derrick-carrying vessel. In addition, they showed that the amount of diving time required was excessive.

(over)

LB

9.16 A PRELIMINARY EVALUATION OF POLYELECTROLYTES AS POSSIBLE WATER CLARIFICATION AIDS FOR TREATMENT OF TURBID FISH PONDS

McDonald, Robert, and Robert Thomas (Nebraska Game and Parks Commission, Hastings, Nebraska 68901)
Progressive Fish Culturist 32, No. 3, 174-177 (July 1970)

Within recent years a new method of using organic polyelectrolytes for water clarification has been implemented. This method has been used in Texas to clarify turbid water for artificial ground-water recharge through wells (Hauser and Lotspeich, 1967). Compared with natural organic or inorganic materials such as alum and ferric chloride, these man-made organic flocculants have extremely high activity per unit weight. Probably the most important advantages of polyelectrolytes over inorganic substances are: (1) low dosage required; (2) high rate of flocculation; (3) formation of large, stable floc; and (4) nontoxicity to aquatic life.

The flocculation mechanism of polyelectrolytes is generally considered to consist of adsorption of the polymer on the suspended particles, followed by interparticle bridging. The efficiency of a polyelectrolyte as a flocculant is determined by its adsorbability and its bridging ability. These actions depend upon the structure of the polyelectrolyte molecules, which is influenced by the charge and the amount of suspended material.

This study was made to evaluate polyelectrolytes, in laboratory and field tests, as water clarification aids, to determine whether such treatment of natural bodies of water would be economically feasible.

(over)

Reprinted in part

9.16

the starfish. The work with mussels has been toward improving the more traditional bed culture. Success with rope culture has been notable. The French bouchot method is also being examined. In this method, lathes are interlaced to form panels, which are set in hurdlelike rows over the beds. This method has some of the advantages of rope culture--for example, freedom from water-borne predators and silt--but, since the bouchots are uncovered between tides, it limits feeding time.

"Rearing Prawns," by J. F. Wickins, from the Ministry-run Fisheries Experimental Station at Conway. The author's unit is working on operational procedures suitable for culturing prawns for the luxury market. Thus culture will have to be intensive; rearing will have to be at a high density and the environment will have to be highly controlled. So far, success has been achieved with the common prawn, the English prawn, the spot prawn (Pandalus particpus), and a giant freshwater prawn from India. At Conway, the giant prawn has been grown to a size of from 40 to 60 g. in 9 months; in Malaysia, it has been grown to 100 g. in a year. These animals are pugnacious, breed readily, and are highly fecund. Instead of the 3,000 or 4,000 eggs produced by the smaller species, it produces from 50,000 to 100,000. With mussel as a feed, conversion efficiency is 7:1. The author's unit is working on a feed mix that can be used instead of mussel, for without it, this prawn cannot be reared economically. [5 photographs]

9.16

Eleven polyelectrolytes were used in the first series of laboratory experiments. Water used in these experiments had suspended solids concentration of 70 to 80 milligrams per liter and a turbidity of 80 Jackson Turbidity Units (J.T.U.).

Those polyelectrolytes which removed 85 percent or more of the colloidal turbidity from the test water were judged to be suitable for further testing. The four polyelectrolytes which met this qualification were: Cat Floc, Purifloc C 31, Purifloc C 32, and Purifloc N 17.

Table 1 includes a summary of the cost of treatment per acre-foot of water for each polyelectrolyte and treatment rate used in the laboratory experiment. Costs per acre-foot would be higher for all the chemicals when used to treat successively higher turbidities.

In eastern Nebraska, a pond with a 9-acre-foot capacity and a turbidity of 550 J.T.U. was selected for treatment. On the basis of performance and cost, Purifloc C 31 was chosen for treatment of the pond.

Late in August, the pond was treated with a 6.0-milligram-per-liter concentration of Purifloc C 31....Six days after treatment, the turbidity was reduced to 30 J.T.U. (a 95-percent reduction). The turbidity did not increase significantly in the 9 months after treatment. [2 tables, 5 references]

9.14

To use a slide rule as a feeding chart, determine the hatchery constant with formula (1). Line up the index of the CI scale with the hatchery constant on the D scale. With this done, the indicator can be moved to any fish length on the D scale and the percent of body weight to feed can be read on the CI scale.

This method of calculating feeding rate eliminates the need for lengthy tables or charts, and the formula for the hatchery constant compensates for variables such as diet, food conversion, and the different species or strains of fish which grow at different rates. Furthermore, fish length and percent of body weight can be determined to hundredths of a unit of the operator wishes. [1 figure, 4 references]

Nelson-Smith, A. (reviewer)
Environmental Pollution 1, No. 1 (July 1970) Quarterly. (Elsevier: Barking, Essex, England) Price 130s per annum.
McIlahby, Kenneth (editor)
Nature 227, No. 5260, 864 (August 22, 1970)

This new journal will specialize in contributions dealing with the social, economic, and engineering aspects of environmental pollution. FTP

9.16

The H-frame is relatively light and can be handled easily. The 2-ft. vertical modules are self-locking every 5 ft., so no clips or connections are necessary. The bottom frame is the platform that supports the rest of the scaffolding. Lateral stability is provided by angled braces driven into the bottom every 10 ft. An attempt to construct the enclosure without divers--by pivoting each section of the H-frame into place from the one previously set and then driving a leg of the scaffolding into the bottom to give a firm footing--showed that any slight variation from the vertical in one section was exaggerated, because of the interlocking nature, as the structure was extended. Thus the author recommends use of the H-frame enclosure only if the builder has the technical capability to align the footing piles with a high degree of precision.

The K-frame permits small contractors to construct fish enclosures in unnavigable waters without sophisticated engineering equipment or piling vessels. Only two poles have to be driven into the seabed--the vertical leg, which supports the fish net and the catwalk, and the offshore bracing leg, which supports the predator net. Cross bracing gives stability to both vertical and offshore legs. Use of standard 21-ft.-long poles, with a piling module of 10-ft., on center, simplifies construction--divers at the Faery Isles test sight were able to erect 20 feet of scaffolding per dive. The divers are needed to locate the underwater poles and tighten the connections (postive lock couplings are recommended, since screwclip enclosed couplings slip under load). They also can be used to attach the rigid-meshed seabed seal and the other nets that are attached to it. Use of a rigid mesh at the bottom makes maintenance and exchange of nets easier than if the net must be buried or held down with rocks and stones, as synthetic fiber nets must be. [4 photographs, 2 references]

9.16 CULTURE OF THE CRAWFISH
(1.89)(1.0118)

Avault, James W., Jr., Larry de la Bretonne, Jr., and Edmonde J. Jaspers (Louisiana State University, Baton Rouge, La.)
American Fish Farmer & World Aquaculture News 1, No. 10, 8-14, 27 (September 1970)

The United States crawfish industry, limited for the most part to the state of Louisiana, produces about 10 million pounds of crawfish annually, valued at about $5 million. Over 35 processing plants are licensed by the Louisiana Board of Health. The crop consists mostly of the red swamp crawfish, Procambarus clarki, and some white river crawfish, P. blandingi. Until recently most of the crop was harvested in the wild. Currently, crawfish culture is practiced using three types of ponds: rice-field ponds; wooded ponds; and open ponds. Crawfish cultured in ponds are harvested the same way as in the wild with the use of lift nets and funnel traps. A good pond will yield about 200 to 800 pounds of crawfish per acre. In 1969, about 12,000 acres were given over to crawfish culture, and this year the number may have doubled.

Research on the biology of and the pond culture of crawfish was started at Louisiana State University in 1964. In this article the authors review some of the highlights of these research studies over the past 6 years. Although crawfish culture is already profitable in Louisiana and the future looks even more promising, many problems need to be solved relative to feeding, harvesting, marketing, and promotion. The authors believe that crawfish culture also has potential in states other than Louisiana. [9 illustrations, 3 tables]

FTP

9.19 ALDRIN: REMOVAL FROM LAKE WATER BY FLOCCULENT BACTERIA
(0.5)

Leshniowsky, Walter O., Patrick R. Dugan, Robert M. Pfister, James I. Frea, and Chester I. Randles (Academic Faculty of Microbial and Cellular Biology, Ohio State University, Columbus 43210)
Science 169, No. 3949, 993-995 (September 4, 1970)

Of 33 aerobic bacteria isolated from Lake Erie, 19 formed flocs in at least one medium and 10 formed flocs in 2 or more media. The ability of two of these latter to concentrate and accumulate aldrin (1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-endo-exo-1,4:5,8-dimethanonaphthalene) from solution was studied. Both took up the pesticide rapidly during the first 20 minutes. The amount of aldrin adsorbed by an equal weight of cell flocs of one, an orange-red pigmented gram-negative rod tentatively identified as either a Flavobacterium or Protaminobacter, remained the same or increased only slightly with time beyond 20 min.; it either decreased or remained unchanged in the supernatant. Adsorption by the other bacterium, a gram-positive species of Bacillus, was more rapid, maximum adsorption required to obtain the first adsorption value being from 12 to 15 min.; all the aldrin added to the test solution was recovered from this floc--none was recovered from the supernatant. The concentrating effect of both bacteria was appreciable. When 0.041 g. of gram-positive floc adsorbed aldrin from 25 g. of water, the concentration factor was about 625:1 within 20 min.; the capability of the gram-negative floc was only slightly less.
[2 figures, 19 references]

LB

9.19 CHROMOSOME BREAKAGE IN HUMANS EXPOSED TO METHYL MERCURY
(0.4) THROUGH FISH CONSUMPTION

Skerfving, Staffan (Department of Nutrition and Food Hygiene, National Institute of Public Health, 104 01 Stockholm 60, Sweden), Kerstin Hansson, and Jan Lindsten (Department of Clinical Genetics, Karolinska Sjukhuset, Stockholm, Sweden)
Archives of Environmental Health 21, No. 2, 133-139 (August 1970)

The authors performed chromosome analysis on cells from lymphocyte cultures taken from nine subjects who had consumed fish contaminated with methyl mercury at least three times a week for more than 5 years. The mercury levels in the fish ranged from 1 to 7 p.p.m. Four older, healthy subjects were studied as controls. The exposed subjects had mercury levels in their red blood cells (mercury concentrations in red blood cells are considered the most reliable index available of exposure to methyl mercury) of between 21 and 370 mμg./g.--that is, from 2 to 40 times higher than the unexposed subjects had. The rank correlation between the frequency of cells with chromosome breaks and the concentration of mercury was statistically significant ($r = 0.6$; $P < 0.05$). Because the frequencies of cells with chromosome breaks varied widely at the different mercury levels, interpretation of the results is difficult. Theoretically, however, methyl-mercury-induced chromosome damage in germ-line cells could give rise to abnormal offspring.
[2 figures, 2 tables, 37 references]

LB

9.19 IN VIVO ASSIMILATION BY COD MUSCLE AND LIVER TISSUE
(9.13)(8.42) OF ELEMENTAL PHOSPHORUS FROM POLLUTED SEA WATER

Dyer, W. J., D. F. Hiltz, R. G. Ackman, J. Hingley, and G. L. Fletcher (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 6, 1131-1139 (June 1970)

Recently Idler (1969) described an incidence of the pollution of sea water in a fishing area with elemental phosphorus resulting in the mortality of some fish. The present study was undertaken to determine the uptake by cod of elemental phosphorus from experimentally polluted sea water. The fish were exposed overnight (16 hr.) to sea water containing 20-80 p.p.b. (parts per billion) of elemental phosphorus; several fish were exposed only 30 min. Fifteen to thirty min. after the fish had been removed from the tank of sea water they were sampled for analysis.

The cod, held in sea water containing the elemental phosphorus, rapidly assimilated the phosphorus into their tissues. In the 16-hr. exposure of cod to 20-80 p.p.b. of elemental phosphorus in sea water, phosphorus was concentrated about 1,000-fold in the liver, from 10- to 25-fold in the white muscle, and about 50- to 100-fold in the red muscle. The distribution of phosphorus in the various tissues appeared to be roughly proportional to the lipid content of the tissues. The absorbed phosphorus was quite uniformly distributed throughout the white muscle of the fillet.

(over)

FTP

9.19 CEQ OFF TO AN AMBITIOUS START

Anonymous
Environmental Science & Technology 4, No. 7, 545-546 (July 1970)

The Council on Environmental Quality (CEQ) has the following assigned functions: to report annually on the condition of the nation's environment, to report environmental trends, to coordinate the environmental programs of all Federal agencies, to evaluate all Federal programs from the standpoint of their environmental impact, to see that environmental factors are properly considered by decision makers, and to propose policies and programs to the President. It is too early, says the author, to judge the success of CEQ in discharging these functions. But if this Council has as much influence on environmental decision makers as the Council of Economic Advisers has on financial decision makers, this new experiment in government will be more than worthwhile. Of the groups that have been formed to help CEQ is one on tax policy (this group will try to answer such questions as: Do present tax policies encourage activities undesirable in respect to the environment? How should the tax structure be modified to encourage individuals and groups to meet environmental goals?) and one on law and administrative procedures (not only will this group consider case studies and analyze environmental legal problems, it will assist in developing model laws and administrative regulations for use by state and local governments). LB

9.16 (1.92) EXPERIMENTS WORK TOWARD EARLY CATFISH SPAWNING

Murphy, J. P., and R. I. Lipper (Agricultural Engineering Department, Kansas State University, Manhattan, Kansas)
American Fish Farmer & World Aquaculture News 1, No. 10, 16-20, 28 (September 1970)

This paper reports on experiments to induce early spawning of channel catfish. Advancing the spawning period by several weeks might make it possible to produce marketable catfish in two summer seasons instead of the usual three.

Channel catfish feed vigorously only when the water temperature is about 70° F. or higher. They spawn about 2 weeks after the water temperature reaches 75° or 80° F. About 7 to 8 days are required for the eggs to hatch. Fry for stocking are available from the middle of June to the middle of July. Ponds may be warm enough by late May for stocking with fry. Some of the fish farmers postulated that if fry were available for stocking by the middle of May, they could produce an 8-inch fingerling during the first growing season and a marketable catfish by the end of the next season. The present experiments, therefore, were carried out in an attempt to induce early spawning of channel catfish.

Tests were carried out using small warmed ponds, one pond was warmed by the condenser water from a power and light generating plant and the other pond was enclosed with a plastic "bubble" structure and was warmed by solar radiation. Somewhat disappointing results were obtained in both tests and the authors conclude that the techniques designed to induce early spawning of channel catfish may be more complicated than originally anticipated. They believe, however, that early spawning of catfish is probably possible. [8 illustrations] FTP

9.19

Because of the high concentration of the elemental phosphorus in the liver tissue, the authors suggest that analysis of the depot fat, or of organs such as the liver, of the fish might provide the most sensitive indication of possible exposure of the fish to elemental phosphorus in the sea-water environment. [2 figures, 4 tables, 8 references]

9.19 CALGON PATENTS CHEMICAL/PHYSICAL PROCESS FOR WASTEWATER TREATMENT

U.S. Patent 3,455,820
Hager, Donald G., and Ronald S. Joyce; Calgon Corporation, Pittsburgh, Pa. 15230
Environmental Science & Technology 4, No. 8, 652 (August 1970)

The polymer-carbon system summarized in the patent comprises treating raw sewage with a flocculant (organic or inorganic) to separate the solids from the liquid, separating the effluent from the flocculated solids, passing the effluent through at least one bed of activated carbon, and periodically backwashing and regenerating the activated carbon. With the system, both secondary and tertiary quality water is produced. The three main advantages of the system are: its capital costs are about 16% less than those of conventional biological treatment systems for secondary treatment and 40% less for tertiary treatment; it removes from 90 to 95% of the organic pollutants (including pesticides, phenols, dyes, polyols, and TNT); it takes 85% less land. Other advantages are: its process is unaffected by toxic chemicals or by sudden changes in pH resulting from shock loads of acids or alkalies; it reduces sludge handling, since it incorporates no microorganisms to die off and produce solids; it is odor free, thus the clarification-adsorption plants can be located anywhere. LB

9.19 PHOSPHORUS, NITROGEN, AND ALGAE IN LAKE WASHINGTON AFTER DIVERSION OF SEWAGE

Edmondson, W. T. (Department of Zoology, University of Washington, Seattle, Washington 98105)
Science 169, No. 3946, 690-691 (August 14, 1970)

This paper describes some of the changes in chemical conditions and algae in Lake Washington following diversion of sewage effluent. Winter concentrations of phosphate and nitrate decreased at different rates: from 1963 to 1969, phosphate decreased to 28% of the 1963 concentration and nitrate decreased only to 80% of the 1963 level. During the period, free carbon dioxide and alkalinity remained relatively high. The amount of phytoplanktonic chlorophyll in the summer related very closely to the mean winter concentration of phosphate, but did not relate to the concentration of nitrate or carbon dioxide. [2 figures, 7 references] FTP

9.19 OIL SPILLS: METHOD FOR MEASURING THEIR EXTENT ON THE SEA SURFACE

Estes, John E., and Bert Golomb (Department of Geography, University of California, Santa Barbara 93106)
Science 169, No. 3946, 676-678 (August 14, 1970)

This article describes a system for the repeatable, economical measurement of the areal extent of oil spills at acceptable levels of accuracy. The system involves overflights of the area with a thermal infrared imaging system, densitometric enhancement of the infrared images, and automatic digital planimetry of the areas of specified image densities. [3 figures, 4 references] FTP

9.19 POLLUTION CONTROL REPORT -- PART 2.
(0.8)

Tubb, Maretta et al.
Ocean Industry 5, No. 7, 38-49 (July 1970)

"Control of Oil Spills--Recent Technical Developments," by Maretta Tubb, pp. 38-40.

In the first two sections of her article, the author discussed various ways of keeping oil off the water and of containing and removing it once it had been spilled. In this part, she considers techniques for studying oil spills and miscellaneous equipment for removing oil from water. [7 figures]

"Two Oil Spill Control Systems Tailored for Specific Tasks," by W. F. Searle, Jr. (U.S. Navy), pp. 45-49.

This article describes two systems being developed by the U.S. Navy to contain or remove oil from our waters. One, the oil scrubber, is primarily for use in calm, inshore waters, although it can be used in moderate seas. It consists primarily of an absorbent belt that is drawn through the oil slick and a wringer, through which the belt is passed to remove and collect the oil. The other system, the TSF boom, is intended for use in rough offshore waters. It consists of a line of segments made of plywood and flexible joints of plasticized canvas. Two ordinary oil drums are strapped to each side of the plywood so that it will float vertically and serve as a containing barrier. Wire rope is used to tie together as many segments as required. [9 figures]

(over)

9.19 RESPONSIBLE MANAGEMENT OF INDUSTRIAL POLLUTION CONTROL

Grubb, Hugh P., Jr. (WED Enterprises, Inc., Glendale, California)
Heating, Piping & Air Conditioning 42, No. 9, 98-100, 170 (September 1970)

This article describes how to organize, initiate, and maintain a program for economical control of industrial aeropols and hydropols. The effective abatement of the industrial contribution to pollution is a local plant management responsibility. Pollution is generally defined by local terrain, weather, and sources, and is not the same for any two locations. The purpose of an industrial pollution control program is to reduce pollution effects to a harmless level through identification of process, measurement, reporting, and finally control of pollutants.

The management of an industrial pollution control program relative to water quality encompasses three considerations: (1) determination of the uses for the body of water, (2) assignment of the criteria of quality necessary to support the uses for the water, and (3) development of a plan to achieve and maintain compliance to the defined criteria.

The three basic considerations in an air pollution control program are: (1) the air pollution saturation potential of the industrial environment, (2) the characteristics of the industrial area subject to the pollutants and the economic impact, and (3) the capacity of the industry to generate pollutants (types, emission rates, and atmospheric reactions).

To achieve the objectives of a pollution control program, management must: (1) organize the activities into a system, examined the data, alter activities

(over)

9.19 POLLUTION CONTROL REPORT -- PART 3.
(0.8)

Ocean Industry 5, No. 8, 31-42 (August 1970)

"Is the Earth's Oxygen Supply Threatened by Pollution of the Sea?" Anonymous, pp. 31-32.

The arguments of scientists who disagree about the answer to this question are given. [6 figures, 6 references]

"New Fuel Combustion System Reduces Air and Water Pollution," Anonymous, pp. 33-34.

The basic design of the French fuel-burning system that drastically reduces solid emissions and maintenance costs while appreciably improving boiler efficiency has been adapted for disposal of industrial wastes. Such pollutants as cyanides, phenols, acetous heavy alcohols, and even muds can be disposed of economically and efficiently. The system with all its controls and ancillary devices will be on the market this fall. [4 figures]

"Using Chemicals for Cleaning Up Oil Spills," Anonymous, pp. 35-40.

The following techniques and methods for cleaning up oil spills are examined: sorbants (silicone-coated expanded perlite, expanded vermiculite, magnetic polystyrene, strikite, treated polystyrene, treated clay, treated sand, and such treated organic materials as sawdust or old coffee grounds), dispersants (Enjay's Corexit 7664 and 8666, British Petroleum's dispersant 1100, Guardian Chemical's Polycomplex A-11, and ARA Chemical's Gold Crew dispersant), oxidation (direct combustion), bacterial biodegradation, jelling, and polymerization. [11 figures]

(over)

9.19 TESTING THE TOXICITY OF EFFLUENTS TO FISH

Alabaster, J. S. (Water Pollution Research Laboratory, Stevenage, Herts., England)
Chemistry and Industry No. 24, 759-764 (June 13, 1970)

The Ministry of Agriculture, Fisheries and Food, has developed a method for use principally in standard toxicity testing of effluents (and other materials including pesticides) toxic to fish. The test was developed in view of the following considerations: the test must be reliable and consistent and be so designed that data can be related to the effect of the effluent on fish of all kinds in rivers. In addition, the test should have adequate sensitivity, have high precision, be simple, and require a size of sample small enough for easy transport to a testing laboratory. In this paper, the author discusses use of the Ministry toxicity test relative to control of environmental factors, choice of test species of fish, the standard apparatus used, and method of expressing the results. The Ministry test was compared with two others--the Trent River Authority method and the Carter "rapid bioassay." The last section of the article considers the relation between laboratory results and effects on fisheries.
[5 figures, 3 tables, 10 references]

9.19

"Design of a Depolluting Ship," by J. Picard (Technocean Co.), pp. 40-41.

A split-hull ship that creates an artificial harbor for restoring relative calm to choppy waters permits removal of oil spills that would otherwise escape in rough seas. It collects a sea-water/oil-emulsion mixture, treats the mixture so the oil is concentrated and can be extracted, and stores or destroys the recovered oil. [4 figures]

"Containment System Combines Boom With Air Barrier," Anonymous, p. 42.

Air blown through scores of holes in the manifolds that run the length of 40-ft. slope sheets directs streams of expanding air bubbles (and the water they entrain) against the perimeter of the oil slick. The oil is driven toward and contained by a boom made of interconnected steel floats. [3 figures]

9.19 (0.8) HIGHLIGHTS OF ON-GOING RESEARCH IN POLLUTION

POLLUTION CONTROL REPORT--PART 4.

Tubb, Maretta

Ocean Industry 5, No. 9, 95-98 (September 1970)

In this part of the series, the following topics are discussed: detecting oil slicks from the air, improving electrodialysis for desalination of brackish waters, biological means of controlling oil pollution, pesticide discharge into the Gulf of Mexico, cards cast adrift in Santa Barbara Channel [to trace ocean currents], synoptic water quality monitoring for Narragansett Bay, effects of fine-grained solids in Long Island Sound, buoy system to monitor pollution in Boston Harbor, use of coal to remove organic contaminants from water, steps taken by oil companies to control pollution, inexpensive NCEL-developed oil-removal devices, and bacteria that consume oil. [5 photographs] LB

9.19

"Evaluating Oil Spill Control Equipment and Techniques," by E. A. Milz (R&D Laboratory, Shell Pipeline Corp.), pp. 40-44.

Equipment tested	Evaluation
booms	All performed equally well in terms of current force. All failed to prevent oil from passing underneath them in seas over 2-4 ft. and currents over 0.7 knot.
air barriers	Generally effective in quiescent water. Will not contain the oil at currents even as low as 0.7 f.p.s.
sorbents (15 floating types)	Pound-for-pound, polyurethane and urea formaldehyde foams are best, removing 10 times more oil than hay, straw, or other sorbents will. No commercial equipment is available to harvest the oil-soaked sorbents.
oil skimmers	Weir types won't work if waves are higher than 1 ft. or water current velocities are 1-1.5 f.p.s. Floating suction types can't be used in water currents above 1 f.p.s. and won't work well in a seaway. Absorbent surface types performed satisfactorily during limited testing.

[8 figures, 2 tables]

[Half-size copies of TSF drawings and further information on the scrubber system may be obtained from Murphy Pacific Marine Salvage Co., Room 1717, 17 Battery Place, New York, N.Y. 10004.]

9.19 (0.5) IN VITRO CONVERSION OF DDT TO DDD BY THE INTESTINAL MICROFLORA OF THE NORTHERN ANCHOVY, ENGRAULIS MORDAX

Malone, Thomas C. (Hopkins Marine Station, Stanford University, Pacific Grove, California 93950)

Nature 227, No. 5260, 848-849 (August 22, 1970)

The purpose of this study was to establish whether the intestinal microflora of the northern anchovy can dechlorinate DDT and to determine the relative importance of bacteria and fungi in the process. The fungi and the bacteria of the intestinal contents of the fish rapidly converted DDT to DDD (little or no DDE was formed). This rapid metabolism of DDT to DDD may be important in the survival of fishes because DDD is less toxic than DDT, and the degradation and assimilation of ingested food require several days. The results suggest, also, that although both bacteria and fungi metabolize DDT to DDE, the fungi are primarily responsible for further degrading DDD to a water-soluble product in anaerobic conditions. [1 figure, 1 table, 12 references] FTP

9.19

where required, and develop feedback; (2) perform an empirical study of all pollutants, their sources, and behavior in a systems framework so as to clearly portray the criteria for pollution control technology and management; and (3) develop quantified objectives of the program to measure accomplishments and to aid in the decision-making process.

The functions of a pollution control program are: (1) establish liaison to obtain information on the research, manufacturing, and facilities operations and processes, new and revised; (2) investigate the operations before they are implemented so as to recommend safeguards to abate or control pollutants; (3) review and approve or disapprove operations on the basis of their pollutant generating characteristics; (4) initiate and implement new or modified procedures to cover new or modified operations; (5) modify the operations for their compliance with the pollution control program; (6) identify pollutants at their sources, measure the process and the environmental loading of the pollutants, and conduct tests that help assure compliance with the requirements of pollution control agencies; (7) establish corrective action for operations or areas of noncompliance; and (8) report activities on pollution control to management and report such data as required to pollution control agencies.

The program for pollution control establishes authority to: (1) direct the abatement and control of all pollutants that might result in violation of local, state, or federal pollution regulations; (2) approve, within the company, all operations that have pollutant-generating implications; (3) identify all equipment and specific pollutant emissions; and (4) obtain any necessary operating permits from controlling agencies.

9.19 SURFACE SLICKS CONTAIN PESTICIDES
(7.43)(9.13)

Anonymous
Australian Fisheries 29, No. 6, 18-19 (June 1970)

"Surface slicks" are calm streaks or patches on the otherwise rippled surface of lakes, coastal waters, and open seas. They may be up to several miles long and over 100 meters wide. Researchers at the Rosenstiel School of Marine and Atmospheric Sciences, Miami, Florida, have found that the concentration of pesticides within these slicks is 10,000 times that in the surrounding water. Thus the fish that feed on plankton concentrated in the slicks, and the birds that feed on the fish, are exposed to an immensely more concentrated dose of pesticides than are fish in other waters.

Also discussed in the article are findings concerning the high pesticide content of atmospheric dust that had crossed 4,000 miles of open ocean and the pesticide content of the rainwater of tropical hurricanes; a new, accurate procedure for determining the pesticide content of water; and the effect of environmental conditions on the pesticide uptake of fish. With the new test procedure, which prevents the fixation of a chlorinated pesticide to the test container's walls and reduces the amount of test solution lost as a vapor, much of the existing inconsistency of the recommended levels of chlorinated pesticides that fish can tolerate will be eliminated. In the experiments on the rate of pesticide extraction from the water by fish, the researchers found that the concentration of pesticide in the fish's blood is not a dependable indicator of the level of toxicity. Temperature, salinity, and pH affect the rate of extraction by a factor of 5 or 6. Using a one-step procedure developed at the school, the researchers rapidly and

(over)

9.6 FISHERIES

Prepared by the Food and Agriculture Organization of the United Nations, Documentation Center, Rome, Italy
Fisheries, FAO Publications and Documents (1945-1969), Vol. 1, Annotated Bibliography; Vol. 2, Author and Subject Index, PU:DC/Sp 14, 1,114 pp. (1969), Price US$12.

This two-volume index--"Fisheries," the first of a new series--covers FAO publications and documents produced from 1945 to 1969 on fisheries subjects. It covers publications issued by the Department of Fisheries and those issued by other departments that deal at least in part on fisheries subjects. The Annotated Bibliography, vol. 1, contains 4,500 entries; the Author and Subject Index, vol. 2, contains 40,900 index references derived from the bibliographic material in the first volume.

9.2 THE COMMERCIAL SHRIMP POTENTIAL IN WEST AFRICA DAKAR TO DOUALA
(1.85)(1.0161)

Pease, Norman L. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Pascagoula, Mississippi 39567)
Commercial Fisheries Review 32, Nos. 8-9, 31-39 (August-September 1970)

At the request of the African Development Bank in Abidjan, Ivory Coast, the Food and Agricultural Organization of the United Nations sponsored a survey of present information on the shrimp resources off West Africa. The objectives of the survey were (1) to find out the available information on the biology of shrimp from the research centers located in the West African area, (2) to determine whether existing fishing companies were interested in harvesting and marketing shrimp, and (3) to prepare an outline for a shrimp-resource survey. This article summarizes the author's original report.

The report discusses the fishing craft and fishermen, then briefly reviews the commercial shrimp fisheries of Senegal, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Nigeria, and Cameroon.
[5 illustrations, 1 table, 11 references]

9.7 COLORADO UNIVERSITY EMPHASIZES FISH CULTURE

Everhart, W. Harry, and Stephen A. Flickinger (Fishery and Wildlife Biology [Colorado State University, Fort Collins])
American Fishes & U.S. Trout News 15, No. 2, 6 (July-August 1970)

Colorado State University has instituted a new course designed to encourage more students to become fish culturists. The general course includes selection of site, water sources, pond and raceway construction, spawning techniques, and marketing. Laboratory sessions supplement the lectures and provide practical field experience. The course includes from 35 to 40 electives, which give the students opportunity to take courses in agricultural marketing, accounting, general business, water engineering--and even welding. These courses supplement the required courses in mathematics, chemistry, biology, and such fishery subjects as fish diseases and fish nutrition. Students with a fishery major are encouraged to spend at least one academic quarter in residence at a fish-production unit, where they receive practical, on-the-job experience. [2 photographs]

9.6 SPRAVOCHNIK TOVAROVEDA PRODOVOL'STVENNYKH TOVAROV
(0.6) [HANDBOOK FOR FOOD SCIENTISTS. VOL. 2]

Anonymous
Moscow: Izdatel'stvo 'Ekonomika,' 456 pp. (1969)
Food Science and Technology Abstracts 2, No. 6, 783, 6G257 (June 1970)

The second section (pp. 89-158) in this 11-section volume is entitled "Fish and Fish Products." It is written by B. P. Nikitin and covers classification, consumer characteristics, chemical composition, quality requirements, handling and processing, live fish, imports, basic defects, and nonfish sea foods. [8-page index]

Extracter: LB

9.3 THE RIGHT OF HOT PURSUIT IN INTERNATIONAL LAW

Poulantzas, Nicholas M. (Asst. Lecturer in International Law, University of Utrecht, The Netherlands)
The Right of Hot Pursuit in International Law, 451 pp. (1969). Published by A. W. Sijthoff-Leyden, Leyden, The Netherlands.

The author examines the right of hot pursuit on land, in the international law of the sea, and in the international air law. He critically analyzes the development of the right of hot pursuit, its present status, and its position in the future. He examines the doctrine of hot pursuit within the framework of international law and in light of recent developments. He considers the right of hot pursuit, among other things, in connection with all recent evolutions in the international law of the sea, including problems pertaining to the fisheries, exploration and exploitation of the Continental Shelf, and pollution of the sea. FTP

9.7 SCIENTIFIC WRITING FOR GRADUATE STUDENTS: A MANUAL ON THE TEACHING OF SCIENTIFIC WRITING

Woodford, F. Peter (ed.)
A Council of Biology Editors Manual prepared by the CBE Committee on Graduate Training in Scientific Writing. The Rockefeller University Press, New York, N.Y. (1968), x + 190 pp. $5.75.
Reviewed by Thomas A. Manar
Transactions of the American Fisheries Society 99, No. 3, 616-617 (July 1970)

This book, the product of journal editors, acquaints the scientific writer with techniques that can be used to make his papers more readily acceptable to editors of journals. LB

9.3 REPORT ON THE PORT REGULATIONS CONCERNING THE ACTIVITIES OF FISHING VESSELS

Beattie, Norman R.
Informe Tecnico No. 12, 11 pp. (1970) (In Spanish and English)

The present Navigation Law, which became operative in 1944, defines territorial waters, establishes a code for the regulation of all Venezuelan and foreign merchant vessels in these waters, and governs the conduct of Venezuelan national vessels outside territorial waters. Fishing vessels are included but are subject to certain exemptions. This report is concerned only with fishing vessels and, with such of the regulations as apply to them while in port. [In it, the author undertakes] to review the port regulations concerning the activities of fishing vessels and to advise on suitable amendments for their simplification.

Reprinted in part

0.5 CLOSTRIDIUM OCEANICUM, SP.n., A SPOREFORMING ANAEROBE ISOLATED FROM MARINE SEDIMENTS

Smith, Louis (Anaerobe Laboratory, Virginia Polytechnic Institute, Blacksburg, Virginia 24061)
Journal of Bacteriology 103, No. 3, 811-813 (September 1970)

During a study of the clostridial flora of marine sediments, the author isolated strains that did not belong to any recognized species. Fourteen of them were sufficiently uniform in morphological and cultural characteristics to form a well-defined group. Because these fourteen strains did not appear to belong to any species previously described, the author carried out further tests to define their species.

The strains were isolated from marine sediments obtained off the Atlantic and Pacific coasts of tropical South America. All strains were gram-positive rods; were motile (by peritrichous flagella); and formed oval spores, mostly in the terminal position but occasionally in the subterminal. The strains were proteolytic, lecithinolytic, and slightly saccharolytic; often formed cells with two spores; and appeared unlike any described species of terminal-spored, proteolytic anaerobe. The author suggested the name Clostridium oceanicum. One type strain has been deposited with the American Type Culture Collection (No. 25647). [1 figure, 2 tables, 5 references]

3.26 (9.2) FROZEN PRODUCTS CAN INCREASE SEAFOOD CONSUMPTION 20%

Anonymous
Quick Frozen Foods 33, No. 2, 99, 100, 106 (September 1970)

This paper is the second part of a report on the results of a survey by management consultants of the Canadian seafood market. Highlights of the survey were presented at the annual Meeting of the Fisheries Council of Canada, St. John's, Newfoundland, in May.

The survey showed that new marketing and promotional approaches are needed because the consumer is critical of the product presented to him and the trade is critical of the obsolete promotional and educational practices. However, the consultants stated that frozen seafood, effectively promoted, could expand the consumption of fish in Canada by about 20% in the next 2 to 3 years. Four target areas must receive attention if we are to increase the sale and consumption of fish. These areas relate to the product, trade relations, consumer education, and the communications media.

Product image can be improved by establishing and publicizing specifications and standards for fish, promoting the concept of "freshness-on-the-plate," creating new products that stress fish as a "flavor experience," and devising innovations in processing and packaging.

Improving trade relations can be accomplished by offering a consistent supply of good quality fish (a grading system would help), and by using more effective advertising and promotion.

More effective consumer education can be accomplished by issuing instructions for preparation of fish, recipes, and cookbooks, and by fish cookery demonstrations.

3.12 BREAKTHROUGH IN PRESERVATION MAY EASE MARKETING PROBLEM

Anonymous
National Fisherman 51, No. 6, 9A (October 1970)

In a paper delivered before the 3rd International Congress of Food Science and Technology (held August 9-14 in Washington, D.C.), Professors Henry A. Dymsza, Spiros Constantinides, Gerald Silverman, and Chester Houston of the University of Rhode Island describe how fresh fish fillets or ground fish can be stored in ordinary plastic bags at room temperature for 2 weeks without loss of freshness. Indications are that fish treated by the experimental preservation process might be stored indefinitely without spoiling.

The process involves removing about 30% of the water from the fresh fish and adding a weak solution of 1,3-butylene glycol or propylene glycol. Propylene glycol has long been recognized as safe for use in foods; it is widely used as a preservative in the new meatlike pet foods that do not have to be refrigerated. Although 1,3-butylene glycol has not been used in foods before, its structure and properties are very much like those of propylene glycol. According to the senior author, research has shown it to be harmless.

Future work by this scientific team will be directed toward stringently testing the safety of the two substances, investigating the possible use of other preservatives, improving the process for preserving whole fish that are so large preservatives reach all parts of the meat with difficulty, and determining the best methods of processing, packaging, and storing the glycol-treated fish.

9.7 SCIENTIFIC LITERATURE IN POLICY DECISION MAKING

Rossmassler, Stephen A. (Office of Science & Technology, Executive Office of the President, Washington, D.C. 20506)
Journal of Chemical Documentation 10, No. 3, 163-167 (August 1970)

Policy takes into account interactions of one technical problem with another, one organization with another, one need with another. Thus the maker of policy cannot reach his decisions purely on the basis of his specialized concern for the immediate problem. Since he cannot select among the problems that require decision, he must make sure that his channels of information cover a broader range of subjects than his own personal interests embrace. Three types of information channels are useful to the scientist concerned with problems of science and technology: individual consultants, panels and committees, and published summary information. These information sources have two common features: each is an indirect channel for the information contained in the original literature and each interposes a screening, selective process between the policy maker and the literature.

Following observations on the method of obtaining the technical information that is to be used in the definition of issues and the making of decisions, the author looks at the present status and the future prospects of scientific literature. [1 figure, 7 references]

Author	Page	Code
Abbey, J. R.	13	3.13
Ackman, R. G.	31	9.19
Alabaster, J. S.	33	9.19
Ambrose, Mary E.	19	7.50
Amundson, C. H.	3	0.5
Andrew, T. R.	15	6.34
Attaway, David	26	9.11
Avault, James W., Jr.	31	9.16
Baertl, Juan M.	18	6.54
Bailey, E.	2	0.35
Baker, Dale B.	36	9.7
Barr, I. G.	14	4.14
Barry, David H.	28	9.13
Baumann, N. A.	3	0.4
Baxter, Kenneth N.	7	1.85
Beattie, Norman R.	36	9.3
Beattie, Wanda G.	4	0.4
Bekasova, O. D.	15	6.32
Ben-Efraim, S.	23	8.51
Benson, A. A.	27	9.13
Berdyshev, G. D.	24	8.51
Bezzubov, A. D.	36	9.6
Bourré, J. M.	33	0.4
Bowbeer, Arthur	9	2.111
	29	9.16
Brachman, Philip S.	21	7.85
Bradshaw, Ralph A.	2	0.38
Broecker, W. S.	24	8.42
Brown, Robert H.	13	2.6
Bull, J. O.	13	2.3
Cakebread, S. H.	16	6.32
Campbell, F. Ross	19	7.43
Canzonier, W. J.	2	0.322
Chatigny, M. A.	6	0.8
Chauhan, V. D.	16	6.34
Chubb, James C. (reviewer)	28	9.15
Clark, Allen V.	1	0.33
Clayton, J. W.	3	0.38
Corbett, Michael G.	9	2.1123
	11	2.1128
Cornman, Ivor	22	7.59
Cox, Allan C.	16	4.90
Cullis, Herbert M.	4	0.5
Dahlström, Harri	9	1.87
Dean, David M.	2	0.38
	25	8.59
Dean, John M.	27	9.13
De la Bretonne, Larry, Jr.	31	9.16
Dudley, Shearon	8	1.33
Dugan, Patrick R.	31	9.19
Dworschak, E.	23	8.51
Dyer, W. J.	31	9.19
Earl, Paul M.	8	1.33
Edmondson, W. T.	32	9.19
Estes, John E.	32	9.19
Everhart, W. Harry	35	9.7
Feng, S. Y.	2	0.322
Fitzhugh, O. Garth	23	7.89
Fletcher, G. L.	31	9.19
Flickinger, Stephen A.	35	9.7
Garlich, Helga H.	2	0.31
Garlinskaya, E. I.	36	9.6
Gaudy, A. F., Jr.	20	7.43
Gelman, Rose A.	2	0.31
George, Paul	16	6.132
Gilbertson, John R.	2	0.31
Goepfert, J. M.	3	0.5
Goldberg, Erwin	23	8.59
Golomb, Berl	32	9.19
Goodwin, T. W. (reviewer)	16	6.32
Graham, Dale E.	4	0.4
Graham, George G.	18	6.54
Graikoski, J. T.	8	1.33
Greenfield, Leonard J.	20	7.49
Griffiths, Raymond C.	7	1.013
	7	1.12
	25	9.11
	26	9.11
Gross, M. Adrian	23	7.89
Grubb, Hugh P., Jr.	33	9.19
Hadjimarkos, D. M.	17	6.54
Hager, Donald G.	32	9.19
Halver, John E.	28	9.14
Hamilton, R. J.	14	4.14
Hamilton, Robert D.	20	7.49
Hanna, G. P., Jr.	17	6.36
Hansson, Kerstin	31	9.19
Harborne, J. B. (ed.)	16	6.32
Hardy, E.	26	8.8
Harjes, C. F.	18	7.0
Harpin, M. L.	3	0.4
Hill, Edward G.	13	2.3
Hiltz, D. F.	31	9.19
Hingley, J.	31	9.19
Hiser, Leland L.	19	7.43
Hofmann, Alan F.	1	0.31
Hsu, Chen-Jung	21	7.51
Hubred, Gale L.	5	0.9
Hudson, Patrick L.	11	2.12
Humenik, F. J.	17	6.36
Hunter, John R.	25	9.12
Huntsman, Gene R.	4	0.39
Idler, D. R.	16	4.90
Ingram, M.	4	0.5
Iskander, I. K.	3	0.5
James, D. G.	22	7.89
Jaspers, Edmonde J.	31	9.16
Jennelle, E. M.	20	7.43
Jones, John M., Jr.	12	2.114
Jossi, Jack W.	12	2.12
Joyce, Ronald S.	32	9.19
Kampelmacher, E. H.	4	0.5
	21	7.86
Kashiwagi, Masaaki	26	9.12
Katz, Morris H.	1	0.34
Kenward, Michael (ed.)	6	0.8
Kerr, Marilyn S.	4	0.4
Khairallah, E. A.	2	0.322
Kifer, Robert R.	19	7.50
	21	7.51
Kirkegaard, I.	8	1.85
Laine, Jorma J.	27	9.14
Lantz, A. W.	14	3.4
Larsson, Karl-Hugo	10	2.1121
Lawes, Glen (ed.)	6	0.8
Lee, Richard F.	27	9.13
Leshniowsky, Walter O.	31	9.19
Lindner, Milton J.	8	1.85
Lindsten, Jan	31	9.19
Lipper, R. I.	32	9.16
Lockwood, Elizabeth A.	2	0.35
MacKinnon, G. A.	16	4.90
MacLeod, W. C.	15	6.34
Malone, Thomas C.	34	9.19
Mantel, Nathan	23	7.89
Markevich, N. B.	28	9.13
Martin, William T.	21	7.85
Mawdesley-Thomas, Lionel E.	28	9.13
McCabe, Mead M.	2	0.38
	25	8.59
McDonald, Robert	29	9.16
Mellanby, Kenneth (ed.)	30	9.19
Miller, David	15	6.195
	19	7.50
	21	7.51
Milne, P. H.	29	9.16
Milz, E. A.	34	9.19
Morales, Enrique	18	6.54
Morgan, Reginald G. H.	1	0.31
Morris, George K.	21	7.85
Moss, Sylvia	3	0.4
Mossel, D. A. A.	4	0.5
	21	7.86
Muftic, M.	22	7.591
Muquardt, Jean	18	6.54
Murphy, J. P.	32	9.16
Naudet, M.	16	4.3
Nelson-Smith, A. (reviewer)	30	9.19
Nemoto, Takeshi	7	1.12
Neurath, Hans	2	0.38
Nevenzel, Judd C.	27	9.13
Oelschlaeger, Walter	20	7.463
Olley, June	22	7.89
Olson, Craig S.	25	8.59
Olson, Paul R.	17	6.82
Paffenhöfer, G.-A	27	9.13
Parker, P. L.	26	9.11
Pease, Norman L.	35	9.2
Pfister, Robert M.	31	9.19
Picard, J.	34	9.19
Pike, G. F.	6	0.8
Piper, Robert G.	29	9.14
Pirskiy, L. I.	24	8.51
Post, George	19	7.43
Poulantzas, Nicholas M.	36	9.3
Randles, Chester I.	31	9.19
Rigdon, R. H.	7	1.85
Rossmassler, Stephen A.	37	9.7
Rothschild, Brian J.	8	1.121
Ruff, Robert Eugene	15	6.30
Searle, W. F., Jr.	33	9.19
Seckel, Gunter R.	25	9.11
Shatunovskiy, M. I.	28	9.13
Shelton, William H.	21	7.85
Shenberg, Esther	23	8.51
Shenker, A. M.	13	2.3
Shorb, Mary S.	13	4.11
Short, Zella	17	6.82
Simpson, John G.	7	1.013
	25	9.11
	26	9.11
Simpson, K.	14	4.14
Sinderman, Carl J.	28	9.15
Singer, James	17	6.85
Skerfving, Staffan	31	9.19
Skinner, Dorothy M.	4	0.4
Small, Lawrence F.	27	9.13
Smith, Louis	37	0.5
Smith, R. J.	18	7.0
Smithson, J. G.	11	2.114
Soares, J. H., Jr.	15	6.195
Spener, Friedrich	15	4.19
Stachiw, J. D.	5	0.8
	6	0.8
Stevenson, Robert E.	8	1.85
Stover, D. L.	5	0.9
Styles, Twitty J.	18	6.69
Sugawara, Yoshio	28	9.13
Sumari, Olli	9	1.87
	10	1.87
	27	9.14
Suzuki, Sanya	28	9.13
Tannenbaum, Steven R.	1	0.33
Taylor, C. B.	2	0.35
Taylor, Donald M.	5	0.8
Telford, Malcolm	4	0.38
Thomas, R. Leslie	19	7.43
Thomas, Robert	29	9.16
Tornes, Eilif	16	6.132
Torten, M.	23	8.51
Tubb, Maretta	33	9.19
	34	9.19
Tye, Ross W.	2	0.38
Vaccaro, Ralph F.	20	7.43
Vaisey, M.	14	3.4
Van de Berg, C.	1	0.321
Van Noorle Jansen, L. M.	21	7.86
Van Olst, Jon C.	25	9.12
Verastegui, Gustavo	18	6.54
Verbruggen, Maria L. (pat.)	13	3.13
Vincentie, H.	21	7.86
Wagner, Thomas E.	21	7.51
Walgemuth, K.	24	8.42
Walker, R. H.	8	1.85
Walsh, Kenneth A.	2	0.38
Weiner, Catherine	20	7.49
Wells, Joy G.	21	7.85
Westman, Kai	9	1.87
	10	1.87
	27	9.14
Williams, Robert J.	9	1.88

Fowler, Scott W.	27	9.13	Klein, Richard G.	28	9.14	Sambuc, S.	16	4.3	Winter, William P.	2	0.38
Franzin, W. G.	3	0.38	Klima, Edward F.	10	2.11	Sand, Donald M.	15	4.19	Woodford, F. Peter (ed.)	36	9.7
Frea, James I.	31	9.19	Klop, W.	1	0.321	Sarshad, A. A.	6	0.8	Wuntch, Thomas	23	8.59
Friedlander, A.	23	8.51	Konovalov, B. V.	15	6.32	Sato, Ryuhei	26	9.12			
Frydman, W. M.	36	9.6	Kyndt, Gaston	18	6.54	Schumacher, T.	24	8.59	Yakovleva, K. K.	27	9.13
Fulk, Winifred Knuese	13	4.11				Seagran, H. L.	8	1.33	Yatsu, Frank M.	3	0.4
									Yong, Marian Y. Y.	8	1.121
									Zhukov, L. A.	26	9.11

SUBJECT INDEX

Subject	Page No.	Code No.
ANALYSIS, GENERAL		
Nutritive Analysis of Frozen Fully Cooked Institutional Foods	18	7.0
ANALYSIS, INORGANIC		
Fluoride in Food	20	7.463
...Protein, Total Amino Acids, and Ammonia in Marine Sediments	20	7.49
ANALYSIS, MOISTURE		
...Determination of Soluble Phosphorus in Lake and Stream Waters	19	7.43
Determination of Inert Gases in Water	19	7.43
A New Approach to Controlling Biological Processes	19	7.43
Response of Natural Microbial Populations...to Organic Enrichment	20	7.43
...Kinetics and Mechanism of BOD Exertion in Dilute Systems	20	7.43
ANALYSIS, ORGANIC		
Production of an Artifact During Methanolysis of Lipids...	13	4.11
Effect of Storage on Fish Meal Quality....	19	7.50
...Protein Evaluation of Fish Meal by Chick Bioassay	21	7.51
Paramagnetic Labeling...1. A New Method for...Proteins....	21	7.51
Dregs From the Sea: Heterotargeting	22	7.59
Preparation of Stable p-Chloromercuribenzoate Solutions	22	7.591
AUSTRALIA AND NEW ZEALAND FISHERIES		
...Good Prospects for Successful East Coast Tuna Industry	7	1.017
AUTHOR INDEX	38-39	
BACTERIOLOGY		
Relation of the Heat Resistance of Salmonellae to...Water Activity	3	0.5
An Automated Microbial Colony Counter	4	0.5
The Microbiology of Dried Foods...Symposium on Food Microbiology	4	0.5
Clostridium oceanicum, sp. n., a Spore-Forming Anaerobe....	37	0.5
BIOCHEMISTRY AND METABOLISM OF FISH		
Genetics of...Lactate Dehydrogenase Isozymes in...Lake Whitefish	3	0.38
Distribution of Ingested Zinc-65 in...Some Marine Crustaceans	27	9.13
...Polyunsaturated Fatty Acids in...the Black Sea...Sea Scorpion	27	9.13
Acid and Alkaline Phosphatase Activity in the Liver...Trout	28	9.13
The Effects of Methionine and Choline Chloride on...Digestive Gland Gland...Japanese Scallop....	28	9.13
...Fat Metabolism of the White Sea Cod [Eleginus navaga Pallas]	28	9.13
BYPRODUCTS, MISCELLANEOUS		
Oyster Shells and Foam...to Improve Quality...in a Fish Incubator	17	6.82
Effect of Holothurin on Trypanosoma lewsii Infections in Rats	18	6.69
CHEMISTRY AND BIOCHEMISTRY		
...a Nonabsorbable Oil-Phase Marker for Lipid Absorption Studies	1	0.31
..."Changes in Protein in Frozen and Dried Foods"	1	0.321
Isolation...of Pigments From Protein-Carbonyl Browning Systems....	1	0.33
Flavor Problems in Food Development and Their Control. Part I....	1	0.34
...Nitrogenous Compounds of Crassostrea virginica Infected With Bucephalus sp. and Minchinia nelsoni	2	0.322
...Changes in Hepatic Lipogenesis During Development of the Rat	2	0.35
...Partial Amino-Acid Sequence of Dogfish Trypsinogen....	2	0.38
Esterase Polymorphisms in the Skipjack Tuna, Katsuwonus pelamis	2	0.38
...Carbohydrase Activities of Some Crustacean Tissue....	4	0.38
...Electrophoresis of Blood Sera and Muscle Extracts From...Fishes	4	0.39
COMPOSITION, INORGANIC		
Barium in Sea Water	24	8.42
COMPOSITION, ORGANIC		
...Cholesteryl Alk-1-Enyl Ethers in...Cardiac Muscle	2	0.31
Triglyceride Analysis: Neatsfoot Oil and Sperm Whale Oil	14	4.14
[Comparative Chemical Study of the Proteins of Raw and Fried Meat From...Point of View of Dietetics]	23	8.51
Leptospiral Agglutinating Factor in Turtles....	23	8.51
...Characterization of Lactate Dehydrogenase: Isozymes in...Trout	23	8.59
...Quantitative Determination of DNA in...Japan Sea Flounder....	24	8.51
...Characteristics of the Smooth Muscle of Mytilus edulis....	24	8.59
Multiple Forms of...Dehydrogenase in the Skipjack Tuna....	25	8.59
DISEASES AND POISONS OF FISH		
Fish Diseases	28	9.15
ECONOMICS AND STATISTICS		
The Commercial Shrimp Potential in West Africa Dakar to Douala	35	9.2
ENGINEERING		
Materials for the Sea		
[Introductory article]	5	0.8
Part 2. Acrylic Plastic Design	5	0.8
Part 3. Acrylic Plastic Design (Continued)	6	0.8
Stirring Up the Oceans for Profit	6	0.8
EXPLORATORY FISHING		
Quantitative Sampling With Three Benthic Dredges	11	2.12
Annotated Bibliography of Zooplankton Sampling Devices	12	2.12
FISH CULTURE		
...Dry Diet Feeding Experiment on Rainbow Trout....	27	9.14
...Arginine and Histidine Requirements of Chinook and Coho Salmon	28	9.14
A Slide-Rule Feeding Guide	29	9.14
Fish Farm Enclosures. 7--The Use of Standard Frame Units	29	9.16
Mussels, Scallops, Queens & Prawns	29	9.16
...Polyelectrolytes...Clarification Aids for...Fish Ponds	29	9.16
Culture of the Crawfish	31	9.16
Experiments Work Toward Early Catfish Spawning	32	9.16
FISH MEAL, NUTRITIVE VALUE		
Selenium Content of Atlantic Gulf Menhaden Fish Solubles	15	6.195
FISH MEAL AND OIL, MANUFACTURE		
[The Grinding of Fish Meal]	16	6.132
FISH PROTEIN CONCENTRATE		
Edible Fish Protein Concentrate (pat.)	18	6.54
FISHERY BIOLOGY AND ICHTHYOLOGY		
Some Aspects of the Organization of Fish Schools	25	9.12
...Osmoregulation of the Chum Salmon...II. Histological Observations of the Branchial Epithelium....	26	9.12
FISHERY EDUCATION		
Colorado University Emphasizes Fish Culture	35	9.7
Communication or Chaos?	36	9.7
Scientific Writing for Graduate Students....	36	9.7
Scientific Literature in Policy Decision Making	37	9.7
FISHING CONCERNS AND AGENCIES		
Opportunities in the Sea		
Forecast of World Ocean Objectives...and When They Will Be Reached	5	0.9
New Slant on the Economy of Manganese Nodules	5	0.9

Subject	Page No.	Code No.
FOOD TECHNOLOGY		
Arsredogorelse 1968-1969 [Annual Report, 1968-1969]	5	0.6
Ice-Making Machine (pat.)	14	0.8
[Ultrasound and Its Application in the Food Industry]	36	9.6
[Handbook for Food Scientists. Vol. 2]	36	9.6
GEAR, FISHING		
Ropes--Advancing Technology	9	2.111
Quick Release Branchline Clip Developed for Longlining	9	2.1123
Development of an Advanced High Seas Fishery and Processing System	10	2.11
Search for the Ideal Trawl	10	2.1121
A Removable Deck-Block Mounting Pad	11	2.1128
Fish Finding With Sonar. Part Seven--Echoes From Fish	12	2.116
HANDLING FRESH FISH		
...Use of Chemicals in Removing Skin From Fresh, Frozen Catfish	11	2.3
Annual Report to the Danish Fishing Industry	14	2.15
LOBSTER		
[Summary: Current Problems in Crayfish in Finland]	9	1.87
The Crayfish Parasite Thelohania contejeani Henneguy...in Finland	10	1.87
MARINE PLANT PRODUCTS		
Kelp Farming	15	6.30
...Determining the Pigment Content of Marine Phytoplankton....	15	6.32
Application and Control of the Algin-Calcium Reaction	15	6.34
Gelling Agents : Resemblance : Differences : Mode of Setting :....	16	6.32
Plant Chemistry	16	6.32
Variations in Alginic Acid Content With Growth...in...Sargassum	16	6.34
...Symbiotic Algal-Bacterial Culture for Wastewater Nutrient Removal	17	6.36
Foam	18	6.34
MARKETING		
Better Financing,Marketing Needed by Catfish Industry	13	2.6
Frozen Products Can Increase Seafood Consumption 20%	37	3.26
NEW PRODUCTS		
Barnacle Glue	17	6.85
NUTRITION AND MEDICINE, GENERAL		
Brain Fatty Acid Elongation and Multiple Sclerosis	3	0.4
Long Chain Fatty Acid Formation: Key Step in Myelination....	3	0.4
Satellite DNAs in Crustacea: Two...Components With the Same Density	4	0.4
The Metabolism of...Lipids by the...Copepod, Calanus helgolandicus	27	9.13
NUTRITIONAL VALUE OF FISHERY BYPRODUCTS OTHER THAN MEAL		
Fluoride Content of Fish Protein Concentrate	17	6.54
Diet Supplementation for Entire Communities....	18	6.54
OCEANOGRAPHY		
The Salinity Structure of the Gulf of Cariaco, Venezuela	25	9.11
The Trade Wind Zone Oceanography Pilot Study. Part IX:....	25	9.11
The Density Distribution in the Gulf of Cariaco, Eastern Venezuela	26	9.11
Numerical Calculation of Upwelling in a Non-Homogeneous Ocean	26	9.11
Sterols in Recent Marine Sediments	26	9.11
OILS, CHEMICAL AND PHYSICAL PROPERTIES		
Neutral Alkoxylipids and Wax Esters of Mullet (Mugil cephalus) Roe	15	4.19
...Dilatometric Characteristics of the Fatty Base of Margarines....	16	4.3
OILS, NUTRITION		
...Scallop Sterols in Relation to Cholesterol in the Chick	16	4.90
PACKAGING		
Thermally Insulated Containers (pat.)	14	2.41
PERIODICALS AND BOOKS		
Fisheries	35	9.6
POLLUTION		
...a System for Thermal Decontamination of Process Air	6	0.8
Records of Pollution	30	9.19
Aldrin: Removal From Lake Water by Flocculent Bacteria	31	9.19
Chromosome Breakage in Humans Exposed to Methyl Mercury....	31	9.19
...Assimilation by Cod...of Elemental Phosphorus From Polluted Sea Water	31	9.19
POLLUTION--Continued		
Calgon Patents Chemical/Physical Process for Wastewater Treatment (pat.)	32	9.19
CEQ Off to an Ambitious Start	32	9.19
Oil Spills: Method for Measuring Their Extent on the Sea Surface	32	9.19
Phosphorus, Nitrogen, and Algae in Lake Washington....	32	9.19
Responsible Management of Industrial Pollution Control	33	9.19
Testing the Toxicity of Effluents to Fish	33	9.19
Pollution Control Report -- Part 2.		
Control of Oil Spills--Recent Technical Developments	33	9.19
Two Oil Spill Control Systems Tailored for Specific Tasks	33	9.19
Evaluating Oil Spill Control Equipment and Techniques	34	9.19
Pollution Control Report -- Part 3.		
Is the Earth's Oxygen Supply Threatened by Pollution of the Sea?	33	9.19
New Fuel Combustion System Reduces Air and Water Pollution	33	9.19
Using Chemicals for Cleaning Up Oil Spills	33	9.19
Design of a Depolluting Ship	34	9.19
Containment System Combines Boom With Air Barrier	34	9.19
Pollution Control Report -- Part 4....	34	9.19
...Conversion of DDT to DDD by the Intestinal Microflora of the Northern Anchovy....	34	9.19
Surface Slicks Contain Pesticides	35	9.19
PRESERVATIVES		
Gas Packaging With Carbon Dioxide	13	3.13
Preserving Foods Under Reducing Gases (pat.)	13	3.13
Breakthrough in Preservation May Ease Marketing Problem	37	3.12
QUALITY CONTROL		
Salmonellae in Fish Meal Plants...at Various Stages of Processing...	21	7.85
...Vibrio parahaemolyticus on Fish and Shellfish, Marketed in The Netherlands	21	7.86
Moisture and pH Changes as Criteria of Freshness in Abalone....	22	7.89
Evaluation of Safety for Food Additives:...Methyl Salicylate....	23	7.89
Notes on Fish and Shellfish	26	8.8
REGULATION AND INSPECTION		
Draft U.N. Convention on the International Seabed Area:....	36	9.3
...Port Regulations Concerning the Activities of Fishing Vessels	36	9.3
The Right of Hot Pursuit in International Law	36	9.3
SALMON		
Sportsman's Guide to Handling, Smoking, and Preserving...Coho Salmon	8	1.33
SANITATION		
Pest Control		
Factory Pests	13	2.3
Pesticides	13	2.3
Preventive Pest Control	13	2.3
SHELLFISH AND CRUSTACEA		
Freezing Tolerance in Mytilus edulis	9	1.88
SHRIMP		
Spontaneous Necroses in Muscles of Brown Shrimp....	7	1.85
Report of the...Biological Laboratory, Galveston...1969	8	1.85
Synposis of Biological Data [on Prawns]	8	1.85
SMOKED FISH		
Flavor Effects of Different Woods on Whitefish Smoked in a Kiln....	14	3.4
SOUTH AMERICAN FISHERIES		
The Fishery Resources of Venezuela and Their Exploitation	7	1.013
TRANSPORTATION		
Preserving Goods in Transit (pat.)	14	2.5
TUNA		
...the Fishery for Yellowfin and Albacore...in the Caribbean Sea and Western Atlantic...by Longliners From Venezuela	7	1.12
Distribution...of Albacore,...on the North Pacific Longline Grounds	8	1.121
VESSELS, FISHING		
Saving the Winch Brakes	11	2.114
Method of Processing Shrimp and Related Shellfish (pat.)	12	2.114

USE OF FUNDS FOR PRINTING THE ABSTRACTS WAS APPROVED
BY THE DIRECTOR OF THE BUREAU OF THE BUDGET APRIL 18, 1968.

SCIENTIFIC PUBLICATIONS UNIT

Thomas A. Manar, Chief

COMMERCIAL FISHERIES ABSTRACTS

Editorial Staff

Frank T. Piskur ..... Editor
Lena Baldwin ..... Associate Editor
Gladys K. Chandler ..... Editorial Clerk

Technical Advisor

Maurice E. Stansby, Laboratory Director
Food Science Pioneer Research Laboratory

COMMERCIAL FISHERIES ABSTRACTS is available to members of the fishing industry and allied interests. Requests for instatement on the mailing list should be addressed to

National Marine Fisheries Service
Scientific Publications Unit
Bldg. 67, Naval Support Activity
Seattle, Washington 98115.

REPRINTS of articles or other material from which abstracts are drawn should be requested either from the author or from the publishing outlet. Addresses of these outlets are printed in *Commercial Fisheries Abstracts* about once a year.

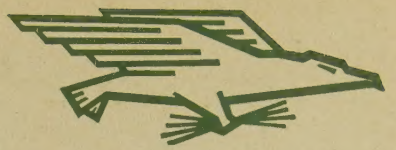
CODE NUMBERS used to identify the subject of abstracts are translated in Fishery Leaflet No. 232, "Fishery Technological Abstract Card System." The Leaflet is obtainable free.

Use of trade names in abstracts
does not imply endorsement of commercial products.

GPO 998-259

UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SCIENTIFIC PUBLICATIONS UNIT
BLDG. 67, NAVAL SUPPORT ACTIVITY
SEATTLE, WASHINGTON 98115

OFFICIAL BUSINESS



POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE